

HORIZON 2020

WORK PROGRAMME 2016 – 2017

Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

Call for Sustainable Food Security – Resilient and resource-efficient value chains

More resilient and resource efficient value chains
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SFS - 2. [2016] Teaming up for good: Associations and mixtures as drivers of productivity and resilience in cropping systems

Specific Challenge: Diversity is recognised as a key element for adaptation of crops to more variable environments (including climate and management). In this context increasing attention is given to associations/mixtures of species and to their potential for stabilising yields and reducing losses caused by plant diseases and abiotic stresses. Crop mixtures for example have shown good potential for managing disease and insect outbreaks or for controlling weeds. Specific crops with pest repellent properties are used in combination with crops which are more susceptible to these pests. Associations of annual and perennial crops have shown particular resilience against abiotic stresses such as drought. There is a need to better understand synergistic plant/crop interactions and how these can be used more systematically in breeding and management practices.

Scope: Activities will help to further unravel the mechanisms (e.g. biological, ecological, biochemical, physical) underlying beneficial plant interactions in cropping systems. This will include looking at the dynamics between plants and their biotic and abiotic environments, for example with regard to resource competition and facilitation (e.g. nutrients, water and light), pest and disease restriction/control or weed suppression. This knowledge - addressing various types of associations, agronomic systems and pedo-climatic zones in Europe - will feed into strategies and tools for breeding and crop management taking into account the corresponding changes in agronomic and breeding practices. Activities should fall under the concept of 'multi-actor approach' and ensure that scientific, farming, agronomic and breeding expertise is adequately considered throughout the work with due attention given to participatory and demonstration activities: The topic is open to all types of crop production and farming systems (e.g. arable; horticulture, grassland, fruit trees, agro-forestry), the diversity of pedo-climatic conditions in Europe and shall benefit both conventional and organic agriculture. International cooperation is encouraged.

Selected projects will closely liaise with complementary activities funded in response to topic RUR-6 on crop diversification systems under the Rural Renaissance call.

The Commission considers that proposals requesting a contribution from the EU of up to 5 million euros would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will support adoption of productive and resilient agricultural systems which capitalise on the benefits of high levels of plant species diversity. This overall goal will be achieved by

- scientifically supported and field tested evidence on the mechanisms underpinning beneficial crop associations
- increasing awareness and knowledge of farmers and breeders on benefits of "plant teams"
- promoting diversity rich crop management practices
- increasing availability of plant varieties suited for implementation of crop associations and mixtures

On the longer term results will support yield stability and diversification in the primary sector, increase resilience against market and environmental fluctuations and support more healthy diets.

Type of action: RIA

SFS - 4. [2017] New partnerships and tools to enhance European capacities for in-situ conservation

Specific Challenge: In-situ conservation (including on-farm) is an important complement to ex situ conservation efforts and particularly relevant to tackle Crop Wild Relatives and landraces. Other than the more static conservation of genetic material in gene banks, in-situ conservation is a means to capture evolutionary adaptation of plants exposed to changing environmental and management conditions, thereby providing a reservoir of valuable traits for adaptation of crops, also to climatic changes. To be effective, in-situ conservation strategies require complex multi-actor approaches and need to be embedded into overall strategies for Plant Genetic Resources.

Scope: Activities will help to build (a) network(s) of in-situ conservation sites (including on-farms and on-gardens) and stakeholders. New partnerships between the conservation, farming, gardening and breeding sectors as well as the wider public will allow building longer term capacities to manage genetic resources in more dynamic and participatory ways and to support their use in breeding, farming and the food chain. Cooperation between conservation stakeholders will allow to improve knowledge on the wealth of available resources as well as access to this genetic reservoir. It will also support demonstration of in-situ genetic resources to the wider public. Exchanges with the breeding sector will provide openings for identification of promising traits from landraces and CWR and increase their use in breeding. Activities will furthermore contribute to developing and showcasing strategies for in-situ conservation and to better linking

ex-situ and in-situ conservation efforts. While targeting in particular European capacities, projects are encouraged to draw on good examples from outside Europe. Work is expected to benefit from contribution of social sciences and fall under the concept of 'multi-actor approach'

The Commission considers that proposals requesting a contribution from the EU of up to 2 million euros would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will significantly strengthen European capacities for conservation, management and use of in-situ genetic resources. They will contribute to

- increasing knowledge on the status and characteristics of in-situ genetic resources in Europe
- establishing more durable partnerships between in-situ conservation stakeholders leading amongst others to more dynamic transfer of plant material or of good practice regarding conservation and management issues
- building a solid framework for national and European in-situ conservation strategies
- diminishing the divide between in-situ and ex-situ conservation efforts
- increased awareness of the wider public as regards the wealth and importance of genetic resources for agriculture and consumers
- increased use of genetic material from in-situ sources in breeding activities and in the food chain

On the longer term outputs will support competitiveness of the farming and breeding sectors, trigger product innovation and foster healthy diets through provision of more diverse food.

Type of action: CSA

SFS - 8. [2017]: Organic Inputs – Contentious inputs in organic farming

Specific Challenge: Despite having stricter standards and limitations with regard to the use of external input, organic agriculture still makes use of a number of products allowed by the EU organic regulation that are only accepted due to a lack of economically and technically viable alternatives. Some of these inputs are not without concerns or not fully in line with the organic principles. The most controversial of these is the use of copper as a plant protection product. However, there is also an urgent need for alternatives to the use of mineral oils (for plant protection), to manure from non-organic farms, to synthetic vitamins and provitamins used in animal production etc. Efforts are needed to progress in the development of alternatives to such contentious inputs.

Scope: Projects should provide a comprehensive overview of the actual use and need for external inputs in various types of organic plant and animal farming systems. Furthermore, work shall identify and develop alternatives to contentious inputs (including use of resistant varieties and strengthening of preventive methods in farm management) and analyse the socio-economic

conditions required for successful adoption in practice. The products and management practices developed should be tested in different pedo-climatic and farming conditions in Europe. Work shall propose strategies for a reduction or a gradual phasing out of contentious inputs without compromising competitiveness of the organic sector. Proposals must make a credible argument for acceptance of these alternatives in any subsequent regulatory acceptance stage. Activities shall allow for a wide geographic coverage within Europe, Associated Countries and relevant Third Countries. Work shall take into account results and conclusions from previously funded research project in the area. Proposals should fall under the concept of 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU up to EUR 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Lower environmental impact of organic and low-input farming systems.
- Widely accessible and cost efficient alternatives to replace contentious inputs in organic farming. Better knowledge of alternatives will also allow a reduction of inputs in conventional agriculture.
- Enhanced organic production, quality and stability.
- Fair, reliable and implementable rules on the use of inputs in organic production.
- Scientific support to relevant EU policies.

Type of action: Research and Innovation Action

SFS - 9. [2016] Spot on critical outbreak of pests: The case of *Xylella fastidiosa*

Specific challenge: *Xylella fastidiosa* - a regulated harmful organism in the EU – has been detected in Italy where it is causing severe damage in particular to olive trees. There is growing concern over its potential to spread and establish throughout Europe and affect a significant number and range of host species (about 300). The consequences of such a scenario are considered major leading to significant yield losses and costly control measures not just in olive trees but also in other economically important crops such as vineyard, citrus, stone fruits and almond. A recent EFSA scientific opinion has confirmed the significant threat to plant health and European agriculture posed by the pest, amongst others because of high levels of genetic plasticity of *X. fastidiosa* and the fact that hosts can be infected without showing *X. fastidiosa* infection signs.

Scope: Proposals will set up a comprehensive package of actions to improve prevention, early detection and control of *X. fastidiosa* in their hosts and vectors. They shall increase knowledge on the biology of the vector, on host range, host pathogen and host plant interactions as well as on epidemiology taking into account both the Apulian strain of *X. fastidiosa* as well as other strains which could represent a serious risk in the EU. Prevention measures should consider both introduction of *X. fastidiosa* within European regions and from Third countries into the EU.

Practical guidelines and solutions shall be developed to early detect, control outbreak and prevent spread of the disease. Attention shall be given to developing integrated measures for crop and disease management in conventional and organic farming systems when eradication is not feasible anymore. Work shall support the development of regional specific risk assessment and eradication plans. International collaboration is encouraged with partners from Third Countries affected by the pest. Activities should fall under the concept of 'multi-actor approach' and ensure solid collaboration between research, plant health authorities and farming sector stakeholders. Activities shall take into account on-going and/or recent work, e.g. funded under the EUPHRESKO ERA-NET.

The Commission considers that proposals requesting a contribution from the EU of up to 5 million euros would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Results of the work will enhance significantly the capacity of farmers and plant health authorities to manage the disease and prevent economic losses in crops. Activities and information gained will help to

- detail knowledge on *Xylella fastidiosa* along with its hosts and vectors
- develop methods and tools for early detection, treatment and where possible eradication
- establish effective risk assessment and prevention mechanisms
- strengthen capacity of regional, national and European plant health authorities to manage important pests and diseases

On a longer term, results of the work will help to ensure that Europeans agriculture remains productive and delivers quality products that meet expectations of consumers and the food chain.

Type of action: RIA

SFS - 10. [2017] Research and approaches for newly emerging diseases in plants and terrestrial livestock

Specific challenge: Trade and movement of goods and people have facilitated the transfer and spread of plant and animal diseases. Intensification and changes in agricultural practices as well as climatic variations are further expected to increase their prevalence. Emerging diseases in plants or terrestrial livestock can be substantial and have significant effects on agricultural productivity, trade and public health. Appropriate and rapid responses by decision makers need to be informed by scientific evidence, addressing as much as possible all components of disease management in particular with regard to epidemiology (e.g. source, transmissibility, susceptible species), host-pathogen interactions, diagnostics, means of prevention and control, as well as risk management.

Scope: Proposals will contribute to finding adequate responses to emerging diseases in plants (work on *Xylella fastidiosa* is excluded under this call topic) and newly emerging diseases in terrestrial animals. They will target one or more pests and diseases (either regulated or non-

regulated invasive or native) currently threatening EU agriculture and causing significant economic losses. The choice of target species should consider the potential threat posed by the pest/disease in terms of development and spread as well as potential impact on agriculture production, public health, or trade. Proposals should increase our knowledge on the biology of the pest as well as development and spread of the disease, also in view developing risk assessment and containment strategies. Work shall bring about knowledge and tools for integrated pest/disease management taking into account changes in agriculture practices, appropriate means of prevention, control and where possible eradication taking into account environmental sustainability of proposed solutions. International collaboration is encouraged with countries affected by the same pests/disease. The proposal should follow a 'multi-actor approach' and be based on active participation of stakeholders from research, plant health authorities as well as the farming and business sectors. Proposals should involve partners from non-EU regions particularly affected by the targeted pests and disease(s). As regards livestock, proposals should contribute as appropriate to the objectives of the STAR-IDAZ international research consortium (see SFS-7 [2016]). Proposals should also work as appropriate in cooperation with further STAR-IDAZ related initiatives and other funded projects in this field such as the project selected under SFS-9 [2016] (HPI topic).

Individual proposals are supposed to tackle either plant or animal diseases. Funding will allow for the support of at least one plant and one animal disease related project.

The Commission considers that proposals requesting a contribution from the EU of up to 5 million euros would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

Knowledge and solutions generated by this action should contribute to:

- Improving management of infectious diseases in plants or terrestrial livestock by the farming sector
- Developing tools for prevention, detection and diagnosis, ideally applicable in a broad manner to plant and animal pests and diseases;
- Decrease economic losses by the farming sector
- Improve food quality and food safety
- Support EU plant and animal health policies

On the longer-term project outputs will help the agricultural sector to remain productive and contributing to food security.

Type of action: Research and innovation action

SFS - 11. [2016] Challenges for disease management: Perennial crops in the tropics and sub-tropics

Specific Challenge: Favourable conditions for disease development in the tropics and sub-tropics hit perennial crops particularly hard, especially where these are grown in uniform plantings. Overall, losses are thought to be 50 to 100% higher in tropical than in temperate regions and estimates of the proportion losses in the tropics caused by diseases range from 30% to 50%. Effects of increased climatic variations are expected to further increase the occurrence of pests and diseases as well resistance against crop protection measures, thereby affecting production of many economically important crops.

Scope: Proposals will develop an integrated approach to management of important pests and diseases of perennial tropical and sub-tropical crops. Activities will address gaps in our knowledge on the disease cycle including climatic and cultural factors that influence the cycle.. They will further develop more effective, durable and sustainable management options which are based on a holistic view of agro-ecosystems as well as on a better understanding of how climatic changes may alter the current scenario of plant diseases and their management. Proposed solutions shall capitalise on advances in information technologies e.g; in view of improving forecasting, monitoring and information on biotic threats. Proposals shall adopt a 'multi-actor approach' based on genuine collaborations between producers (including small farmers), researchers, advisory services and the commercial sector. Dissemination and demonstration of findings and outputs shall be given particular attention. The integration of social and economic sciences will support uptake of new methods and tools in plant disease management. International collaboration with Third Countries is essential to meet the requirements of the topic.

The Commission considers that proposals requesting a contribution from the EU of up to 4 million euros would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Project outputs will result in increased uptake of multifaceted and integrated disease management approaches. These will benefit production of important perennial crops in tropical and sub-tropical regions within and outside Europe by

- delivering applicable knowledge on the biology of pests and diseases and the diseases cycle
- increasing the set of measures and tools available to farmers to deal with important pests and diseases, reduce yield losses and promote vigorous crops
- enhancing capacity of the farming sector to apply/adopt more complex cultural practices in line with integrated pest and disease management principles
- reducing reliance on critical pesticides in farming practices
- improving capacity of plant health authorities and advisory services to prevent diseases
- trigger innovations with regard to product, technologies and services in support of plant health and plant protection

On the longer term projects will help securing/increasing productivity of important perennials in tropical and subtropical regions. They will thereby strengthen the contribution of the agricultural sector to rural economies and overall economic development.

Type of action: RIA

SFS - 12. [2016]: Support for international research on animal health

Specific Challenge: Animal diseases can cause serious social, economic and environmental damage and in some cases also threaten human health. An increasing number of the major disease problems or threats faced by the livestock industry and zoonoses are of a global nature.

Improved coordination of and international collaboration on research activities is needed to expedite the development of improved prevention and control methods, ensure the sustainability of the livestock industries and protect human health.

Scope: This global initiative will consolidate and deepen the international collaboration on research in the area of animal health and in particular infectious animal diseases, including zoonoses and parasites. It will build on the existing activities of STAR-IDAZ global network of research programme owners and funding organisations by bringing together researchers and organisations investing in animal disease research (funding bodies) in order to achieve specific targets relating to the prevention and control of priority animal diseases and zoonoses. The action will provide organisational support to the implementation of the global infectious diseases of animals and zoonoses consortium (STAR-IDAZ) goals, in close collaboration with the European Commission, research funding agencies from Member States and from other third countries involved through the formation of a scientific secretariat. It will assist the Consortium executive committee, and the establishment and running of working groups on priority diseases and issues and organising research gap analysis meetings. It will support information exchange among members of the participating organisations at all levels. It will communicate progress of Consortium research, including collecting and disseminating pertinent information and results to the researchers funded by the Consortium members.

The Commission considers that proposals requesting a contribution from the EU up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- The project should contribute to the overall goals of the global infectious diseases of animals and zoonoses consortium (STAR-IDAZ). It will support cooperation in the consortium, including meetings, internal and external communication, shared data, research results and common databases.

- It will help mobilise and coordinate the global research effort to address the existing and emerging disease challenges and so hasten the delivery of new or improved control tools or strategies.
- It will support an increased focus of effort through research gap analysis, prioritisation, and alignment of research programmes and coordination of research activities which over a five year period will result in new or improved disease control tools, including vaccines, diagnostics, therapeutics and/or critical underpinning scientific information relating to the control of specific target diseases.
- Through providing support for the activities of STAR-IDAZ, it will contribute to the improvement of animal health internationally, to a decreased risk to human health from animal infections and related threats, while improving efficiency of livestock production, global food security and competitiveness of livestock of livestock production

Type of action: CSA

SFS - 13. [2016]: Validation of diagnostic tools for animal and crop health

Specific Challenge: The simple and swift detection, accurate identification and proper quantification of pathogens and other factors of concern for plant and animal health, including zoonotic agents, and correlates of infection (e.g; host-response biomarkers) and/or immunity in a fast and reliable way are critical components in the monitoring and control of their introduction or spread. These tools are essential to avoid or reduce related economic costs, trade disruptions or even sometimes human health risks. These methods are used not only by Competent Authorities, but also by private laboratories or directly by veterinarians at the point of care, practitioners, business operators. In the last years, most of the research efforts have been put in the development of high throughput, generic, quick and cheap methods. A number of these methods have been validated intra-laboratory or through limited ring trials. In order for these methods to be used beyond research laboratories, additional work often needs to be performed to further test the methods such as further ring tests, development of reference materials, harmonisation or even adaptation for their implementation in field conditions (sampling methods, multi-targeting; pen-side tests, mobile analysis).

Scope: The project aims primarily at harmonising and validating (including ring trials) existing and new developed protocols for the detection and quantification of pathogens and other factors of concern for health of plants and terrestrial animals, and correlates of infection/immunity. A good justification on the choice of protocols to be validated should be given. Research is built on existing results, but where necessary final further development of the promising protocols can be pursued aiming at bringing close to market end products, including swift, portable tools for field testing. Where generic methods are tackled or preferred (e.g. based on next generation sequencing technologies) cooperation amongst stakeholders is encouraged to ensure use of the technologies for a broader spectrum of organisms. Connections with EU Reference Laboratories, European/International bodies for standardisation (e.g. CEN, ISO) and International Reference

bodies (e.g. OIE, WHO Collaborating Centres and/or Reference Laboratories) should be ensured. The project should ensure appropriate dissemination to relevant stakeholders to facilitate uptake of results.

The Commission considers that proposals requesting a contribution from the EU up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Individual proposals are supposed to tackle either plants or animals. Funding will allow for the support of at least one plant and one animal disease related project.

Expected impact: Validated protocols for the detection and quantification of pathogens and correlates. Support to Plant and Animal Health policies by providing validated protocols to be used by Competent Authorities, Reference Laboratories. End-products brought to the market, such as swift, portable tools for field testing by veterinarians, practitioners, business operators.

Type of action: Innovation Action

Healthy and safe foods and diets for all
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SFS - 41. [2017] How to tackle the obesity epidemic?

Specific challenge: Obesity is now a critical global issue, requiring a comprehensive intervention strategy rolled out at scale. More than 2.1 billion people – nearly 30 per cent of the global population – are overweight or obese. Obesity is responsible for about 5 percent of all deaths a year worldwide, and its global economic impact amounts to roughly € 1.7 trillion annually. If its prevalence continues on its current trajectory, almost half of the world's adult population will be overweight or obese by 2030.

Obesity is a gateway to many other chronic diseases such as type 2 diabetes, cardiovascular and heart diseases and cancers as well as a multitude of adverse social and psychological conditions affecting quality of life, mental health, physical, and health care costs as well as the efficiency of the workforce. Weight stigma may contribute to reduced employment opportunities and decreased access to preventive health cares and insurances. A wide range of factors interacting at various different levels (e.g. biological, demographic, psychological, behavioural, socio-cultural, environmental and governmental levels) are known to be associated to obesity. To address the complex on-going obesity epidemic challenge, experts from different disciplines need to work together with new ways of thinking to solve this societal challenge and use their combined knowledge to provide the most innovative research ideas. There is a need to broaden the view on obesity by looking at the various national initiatives (such as motivational programmes with dietary and lifestyle incentives), assessing existing and performing new dietary and lifestyle interventions, and analysing the influence of deliberate manipulations of the environment on food choice, daily diet and physical activity. The potential of choice architecture, behaviour change, and various forms of policy development and regulation should be critically evaluated.

Scope: Within the context of improving public health and sustainable economic growth, the aim is to reduce effectively the prevalence of obesity and its comorbidities by improving strategies/approaches for prevention with healthier lifestyle and sustainable dietary behaviour. This requires a multidisciplinary approach that brings together academics, policy makers and the relevant industries. A multidisciplinary approach combining for example genetic/epigenetic and other bio-molecular approaches, microbiome, gut-brain signalling, physiological, nutritional, physical activity, behavioural, educational, environmental, architectural, socio-economic, psychological, cultural and other relevant expertise is necessary to better understand the complex interaction between these factors influencing obesity in individuals and populations. Alternative approaches and/or tools to study key components of energy balance and to assess the severity of obesity and its comorbidities and healthiness that go beyond the BMI, could be relevant. Building on existing research, holistic and innovative dietary and lifestyle intervention studies are needed in order to clearly demonstrate the effects of the different factors. The gender dimension shall be taken into account. In line with the strategy for EU international cooperation in research and innovation, international cooperation is encouraged, in particular with the US, Australia, New Zealand and Canada.

Expected impact: In the framework of tackling the obesity epidemic, proposals should show how some, or all, of the following impacts will be achieved:

- Generate a better understanding of the factors influencing the obesity epidemic.
- Contribute to reduce the obesity epidemic, improve public health and develop a healthier and sustainable behaviour. Transfer of knowledge to target groups in developing of new dietary and lifestyle tools that empower citizens to be active and engaged in lifelong strategies.
- Support to the development of the European Research Area.

Type of action: RIA

Call for Blue Growth - Demonstrating an ocean of opportunities

Strengthening the European ocean observing, surveying and monitoring capability

BG- 9- [2016]: Unified integrated Arctic Observing System

Specific challenge: The Arctic is the theatre of profound transformation. Climate change is deeply impacting on the sea-ice extension and thickness, on ice-sheet melting, on permafrost thawing, and on marine and land ecosystems. These changes are bringing with them both risks and opportunities, and an integrated and multi-disciplinary Arctic observing system is becoming essential for studying, forecasting and assessing changes supporting the sustainable development of the region. The improvement of current assessment and prediction capabilities of Arctic environmental change requires the provision of data on a number of key variables of Arctic meteorology, climate, oceanography, and pollution. Monitoring and improved understanding of

the Arctic climate system and its teleconnections, as well as ecosystem change and socioeconomic impacts on offshore operations, new shipping routes, mining activities, tourism etc. are important prerequisites for effective assessments of climate change adaptation and mitigation strategies in the Arctic and elsewhere.

Scope: The “Unified Arctic Observation system” should close critical gaps with innovative solutions, as well as improve the integration and inter-operability of existing observation systems. The activity shall be based on co-operation between the existing European and International infrastructures (in-situ and remote incl. space-based) and the numerical prediction communities, with active participation from relevant stakeholder groups. The action should, in line with the strategy for EU international cooperation in research and innovation (COM(2012)497), contribute to implementing the Transatlantic Ocean Research Alliance, the Sustaining Arctic Observation Networks (SAON) and the Cold Region Initiative of the Group on Earth Observation (GEO), and also support additional activities implemented through the Transatlantic Ocean Research Alliance. The action should connect with the relevant Copernicus and European Space Agency (ESA) programmes and infrastructure in order to maximise the synergies among the European efforts to deliver the Integrated Arctic Observing System. In particular, strong coordination with the ongoing Horizon 2020 project aiming at the development of an Integrated Atlantic Ocean Observation System should be sought.

The activity shall support and promote integrated use of Arctic land, ocean, ice and atmosphere observations from Europe, US, Canada and other international partners. Community-based observing programmes that draw on indigenous and local knowledge should be included and form the basis for participatory research and capacity-building within Arctic communities. The action should ensure data interoperability through internationally recognised standardisation and quality assurance/quality control (QA/QC) processes, promote database integration and allow free and open access to all data and data products, and should contribute through novel technology development to fill out in-situ observational gaps. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant each from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries would add further value.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The project’s results are expected to:

- Increase temporal and geographic coverage of observational data in the Arctic;
- Support standardization and improve inter-operability of Arctic observational data.
- Improve the integration of space-based and in-situ Arctic observations into process and climate models and forecast systems; long-term improvement of Arctic observation systems and related services.

- Integrate with existing pan-arctic monitoring networks by building additional capacity and adding monitoring parameters to current programmes;
- Reduce cost of data collection in support of Arctic-related economic and societal activities;
- Lead to better-informed decisions and better-documented processes within key sectors (e.g. shipping, tourism, fishing);
- Support international assessments of global challenges such as climate change, scarceness of natural resources and global scale hazards;
- Enhance the societal and economic role of the Arctic region and support the EU strategy for the Arctic and related maritime and environmental policies;
- Contribute to the GEO Cold Region Initiative and to the Transatlantic Ocean Research Alliance;
- Contribute to the Sustaining Arctic Observation Networks (SAON) process;
- Contribute to the WMO Programme Year of Polar Prediction (YOPP).

Type of action: Research and Innovation Actions

BG-10-[2016]: Impact of Arctic changes on the weather and climate of the Northern Hemisphere

Specific challenge: The Arctic climate is changing more rapidly than in any other region. There is evidence that these changes strongly affect ecosystems, people and societies living inside and outside of the Arctic, including Europe and North America. A better representation of processes specific for the Arctic (e.g. related to sea-ice formation and melting) in weather and climate models is required to better constrain the role of the Arctic in the global climate system. In connection with improved observations in the Arctic (Topic 1) this is necessary to improve weather and climate prediction in the Northern hemisphere. These services are essential for managing the risks to infrastructure, agriculture, and other aspects of society across Europe.

Scope: Proposals should develop innovative approaches to improved descriptions and modelling of the mechanisms, processes and feedbacks affecting Arctic climate change and its impacts on the weather and climate of the Northern hemisphere. The assessment of the performance of state-of-the-art models in simulating key processes, and the linkages between polar and lower latitudes through well-evaluated coordinated model experiments, are critical to ensure that improved knowledge leads to advanced climate models and predictions. Actions should also explore the potential that an improved Arctic observing system – subject of another topic in this Call – would have on the accuracy of weather and climate forecasts in the Northern Hemisphere including Europe and North America. The activities should contribute to the programme of the Year of Polar Prediction (YOPP) and provide input to the improvement of short- to medium-term predictions of the Copernicus Climate Change services (C3S).

Proposals should include a work-package to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020, and build on those funded under earlier calls. Proposals should develop relevant forms of communication with the EU (and possible national) services to adequately disperse results that could be used for policy action. In line with

the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant each from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries is also strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 million and EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The project's results are expected to:

- Enhance predictive capacity of the weather and climate of the Northern hemisphere, and allow better forecast of extreme weather phenomena;
- Improve the capacity of response to the impact of climatic change on the environment and human activities in the Arctic, both in the short and longer term;
- Improve the capacity of climate models to represent Arctic warming and its impact on regional and global atmospheric and oceanic circulation;
- Contribute to a robust and reliable forecasting framework that can help meteorological and climate services to deliver better predictions, including at sub-seasonal and seasonal time scales;
- Enhance stakeholders' capacity to adapt to climate change;
- Contribute to better servicing of economic sectors which rely on improved forecasting capacity (e.g. shipping, mining);
- Contribute to the Year of Polar Prediction (YOPP) and IPCC scientific assessments, and to the Copernicus Climate Change (C3S) services.

Type of action: Research and Innovation Actions

BG-11- [2017]: Climate impacts on Arctic ecosystems, resources, new economic activities

This topic is presented with two possible options, showing both positive and negative elements.

In Option 1 the subject is left intentionally broad. The positive aspect is that this fosters a bottom-up approach and the submission of potentially ground-breaking ideas. The potential risk is to receive proposals which partially overlap with already funded actions, with - consequently - a limited impact.

OPTION 1: Climate impacts on Arctic ecosystems, resources, and new economic activities (2017)

Specific challenge: The 'Arctic amplification' of global warming has led to major and quantifiable changes across the region. Examples include the melting of ice-sheets and glaciers, the thawing of

permafrost, the decreasing extent of sea-ice and the warming and acidification of the Arctic Ocean. These rapid changes put considerable stress on ecosystems and have, as well, an important socio-economic impact. Additional human activities linked to new shipping lanes opening up, previously inaccessible natural resources becoming accessible, and moving fish stock are putting added pressure on the Arctic ecosystems, and represent both risks and opportunities for indigenous populations, local communities and economic actors.

Scope: Proposals should develop an innovative approach to assess the ecological and socioeconomic impact of climate change and of new economic activities within the Arctic Ocean and surrounding landmasses on ecosystems, living resources and society. The needs, priorities and perspectives of indigenous populations, local communities and the economic actors operating in the region need to be considered in a context of economically, environmentally and socially sustainable development. Actions should address key processes with high socio-economic impact and provide solution-oriented and appropriate adaptation and mitigation responses, as well as support capacity-building for sustainable livelihoods. Innovative actions should go beyond the current state-of-the-art and support synergies among European and national actions. Appropriate consideration should be given to the geo-political and geo-strategic framework. Projects should include a work-package to cluster with other projects financed under this topic and – if relevant – also under other parts of Horizon 2020. Proposals should develop relevant forms of communication for EU (and possible national) services to adequately disperse results that could be used for policy action. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to implementing the Transatlantic Ocean Research Alliance.

Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant each from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries is also strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 million and EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The project's results are expected to:

- Enhance the capacity to model and predict the socio-economic impact of key processes of change in the Arctic.
- Improve the predictability of poorly represented processes.
- Contribute to the sustainable management of Arctic ecosystems and thus support the provision of ecosystem services and natural resources for improved societal well-being.
- Promote sustainable economic Arctic opportunities arising from climate change and support the leverage of regional (EU) funds into these opportunities.

- Contribute to the mapping of areas of potential economic and social development;
- Support the competitiveness of European industry, particularly SMEs, engaging in sustainable development of the Arctic.
- Enhance the engagement of and interaction with residents from Arctic communities and indigenous societies and develop a legacy of collaborative community involvement with scientific, economic, and societal actors and stakeholders.

Type of action: Research and Innovation Actions

OPTION 2: Climate impacts on Arctic permafrost, with a focus on coastal areas, and its socio-economic impact (2017)

Specific challenge: Arctic permafrost contains twice as much carbon as the atmosphere, stored in the upper metres of the ground. Thawing of permafrost may trigger the release of this carbon and its transformation in greenhouse gases, reinforcing global warming ('permafrost carbon feedback'). Permafrost coasts make up 34% of the coasts of the world. Assessing the lateral transfer of material including organic matter from land to sea and its fate on the Arctic shelves is one of the most pressing challenges for understanding the impact of permafrost thawing on climate change and its direct implications for indigenous populations and local communities. The upper shelf environment itself is largely under-investigated and processes of accumulation and/or subsea permafrost degradation are not accounted for in global climate and Earth system models.

Scope: The action should model and assess the impact of permafrost thawing on Arctic (natural and human) coastal systems and its effect on availability/accessibility of resources and the growth of new economic activities, considering the needs of indigenous populations, local communities and the economic actors operating in this vulnerable region, in a context of economically, environmentally and socially sustainable development. Actions should address key processes of environmental change and develop appropriate adaptation and mitigation responses with an emphasis on permafrost at the interface between land and water. Actions should put emphasis on partnerships and should co-design research with residents from Arctic coastal communities and with economic actors. Proposals should develop relevant forms of communication for EU (and possible national) services to adequately disperse results that could be used for policy action. Trans-disciplinary and participatory approaches, including social sciences and humanities, in the process are considered necessary. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant each from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries is also strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU in the range of

EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The project's results are expected to:

- Enhance the capacity to model permafrost thawing, sub-sea and on land, identify and reduce uncertainties, and quantify key processes not currently or poorly represented in predictive models.
- Identify economically, environmentally and socially sustainable Arctic opportunities arising from climate change, and harness the potential of living resources within the global context of competing interests from different sectors and countries and contribute to the competitiveness of European industry and particularly SMEs.
- Promote the engagement of and interaction with residents from Arctic coastal communities and indigenous societies and develop a legacy of collaborative community involvement with scientific, economic, and societal actors and stakeholders.

Type of action: Research and Innovation Actions

BG-12-[2016]: Towards an integrated Mediterranean Sea Observing System

Specific Challenge: The achievement of economic, environmental and societal sustainability of Blue Growth in the Mediterranean Area requires the understanding and forecasting of the evolution of the ecological, social and economic processes in the region. This must take into consideration the proper functioning of vulnerable marine ecosystems and sea-related economic sectors. In the Mediterranean region, several issues are specifically acute such as the vulnerability and poor resilience of ecosystems, the over exploitation of seabed and biological resources, the severe pollution events and limited remediation actions, the drastic climate change effects, the frequent extreme events and geohazards, and the uneven protection of coastal infrastructures and populations. The EU is committed to support the development of solutions to solve the above issues through several policies and international agreements such as the EU Integrated Maritime Policy (IMP), the Marine Strategy Framework Directive (MSFD), the Common Fishery Policy (CFP), the EU neighbourhood policy, the Barcelona convention and more recently the EU BLUEMED Initiative . One of the main targets of the later is to create an interoperable, fully integrated multiplatform observing and forecasting capacity supporting the conservation of biodiversity, forecasting and management of risks and emergencies at the coast and at sea. The implementation of those policies and conventions are all requiring a strong knowledge base and predictive capacities that are derived from Earth observation data. Those observation data that are however still very fragmented, or even lacking for certain areas of the Mediterranean Sea in particular in the southern part, and remain difficult to be accessed partly because of the many initiatives and systems existing. The challenge with this topic is to conduct the research and innovation activities necessary to facilitate the integration of the existing Earth observation facilities and networks in the Mediterranean Sea building on initiatives such as Copernicus , GEOSS, GOOS , EMODnet , ESFRI relevant projects, and national initiatives, to fill out the existing

observational gaps, and to exploit the relevant data to build the necessary knowledge base and prediction capacities.

Scope: The research and innovation activities to be included in the proposal should contribute to the development of an Integrated Observing System for the whole Mediterranean Sea building on existing facilities (remote sensing and in-situ) and initiatives, addressing both the open sea and the coastal zone. This should be based on open data and facilitate easy access to them. Another R&I focus will be to conduct the research and innovation necessary to underpin the full and open discovery and access to the ocean observations and facilitate the interoperable exchange of ocean observation as promoted through GEO (Group on Earth Observation) at the scale of the Mediterranean Sea. The proposal should also address observational gaps in the Mediterranean Sea in particular those related to the in-situ component of the observation system. Through optimising existing systems and the use of new ocean observation technologies the cost effectiveness of in-situ ocean observation and the integration of the biological dimension into observing systems should be enabled. The proposal should focus as well on the use of in-situ measurements to calibrate and validate relevant remote sensing data and products, including possible new products derived from space infrastructures such as the Sentinel and Earth Explorer missions supporting the improvement and evolution of operational services in the Mediterranean Sea. The above activities should include participation of international partners from the coastal states of the Mediterranean Sea.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 7 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: To contribute to implement the vision of the BLUEMED Initiative, its related Research and Innovation Agenda and Implementation Plan and in particular what regards its goals towards the development of an integrated Mediterranean observing system, proposals will have to:

- Contribute to implement the BLUEMED Initiative' vision, its related Research and Innovation Agenda and Implementation Plan. Achieve its goals towards the development of an integrated Mediterranean observing system.
- Provide an additional European contribution to established global observing systems e.g. Copernicus and GEOSS. Provide of a Mediterranean Sea Integrated Observing system as a component for GEOSS.
- Contribute to increase the temporal and geographic coverage of observational data in the Mediterranean Sea and identify observational gaps.
- Improve modelling outputs and improve cost effectiveness of data collection in support of ocean-related industrial and societal activities.
- Enhance the knowledge base necessary to cope with global challenges such as climate change, scarceness of natural resources and regional hazards, to make better informed

decisions within key sectors, and increase safety of offshore activities and of coastal communities.

- Improve the implementation of European maritime and environmental policies and international agreements (e.g. Marine Strategy Framework Directive, INSPIRE Directive , Common Fisheries Policy, EU Integrated Maritime Policy, Barcelona convention) by providing the knowledge base necessary to support policy decisions towards the sustainable growth of the EU Mediterranean marine and maritime economy.

Type of action: Research and Innovation Actions