Draft Horizon 2020 Work Programme 2016-2017 in the area of Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

Important notice:

This paper is made public just before the adoption process of the work programme to provide potential participants with the currently expected main lines of the work programme 2016-2017. It is a working document not yet endorsed by the Commission and its content does not in any way prejudge the final decision of the Commission.

The adoption and the publication of the work programme by the Commission are expected in mid-October 2015. Only the adopted work programme will have legal value.

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Introduction

This Work Programme will leverage research and innovation to address major societal challenges:

- Ensuring food and nutritional security, together with resource efficiency, and facing climate change. According to the FAO, to meet food demand to feed a global population projected for over 9 billion by the year 2050, a 60% increase in global agricultural production is necessary relative to 2005. And this challenge has to be met in the context of increasing resource scarcities while minimizing food safety risks and adapting to/mitigating climate change. It will be crucial to develop win-win solutions that bring together the primary sector and the food industry, considering nutrition, health, water and energy efficiency, zero waste and environmental sustainability in a holistic way.

- Sustainably exploiting the potential of the oceans, which cover 70% of the earth's surface and host 50% of known species. Over 90% of the ocean habitat is in the deep sea and less than 10% of this has been explored. Unlocking the potential of seas and oceans across the wide range of marine and maritime industries requires an integrated approach to ensure a responsible management of resources and to maximise synergies between activities and boost growth and employment in coastal areas.

- Promoting dynamic territorial development, through the mobilisation of rural and coastal economies. Rural or semi-rural areas represent about 88% of EU territory and account for 46% of the Gross Value Added and 55% of jobs. Setting the right framework conditions and developing key skills will be critical to foster innovation in rural areas, helping them generating economic activities and coping with the various dimensions of sustainability.

- Boosting investment, employment and economic growth in the European Union. The various sectors accounted under the bioeconomy are already worth EUR 2 trillion in annual turnover and account for more than 22 million jobs, and their potential is still greater. For example, it has been estimated that the volume growth of EU bio-based chemical products could be over 3% per year up to 2020, resulting in a market worth EUR 40 billion and 90,000 new jobs. Furthermore, the food industry is the largest industrial sector in the EU and there is still further potential to grow, with new businesses and industries emerging in both traditional and novel non-food sectors.

The policy framework to address these challenges is set by President Juncker's Political Guidelines for the European Commission. In particular, this Work Programme will directly support the priority of providing "A New Boost for Jobs, Growth and Investment", on creating "A Connected Digital Single Market", on developing "A Resilient Energy Union with a Forward-Looking Climate Change Policy" and "A Deeper and Fairer Internal Market with a Strengthened Industrial Base". And this framework is further defined by the main

policy areas that this Work Programme is referring to: EU Bioeconomy Strategy, the EU Common Agricultural Policy, the EU Integrated Maritime Policy and the EU Common Fisheries Policy. These are further complemented by the EU environmental, industrial, health, food safety, forestry, social, energy and regional development policies and initiatives

The overall objective of this Work Programme is to help set Europe on a solid basis to sustain food security, the natural resource base and sustainable growth path, adapting and innovating to find resilient and efficient alternatives to our fossil-based economy. It will test, demonstrate and transfer effective solutions to major challenges affecting the Bioeconomy on land and sea, across the agri-food chain from soil to society. European research and innovation will unlock the potentials of available bio-resources in the different bioeconomy and blue-economy sectors in a sustainable and socially responsible way.

This Work Programme also aims at bringing Research and Innovation at the heart of major primary sectors - such as agriculture and fisheries -, to face the new challenges ahead, taking advantage of new potential in the biological, ecological, technical and information technology domains.

This Work Programme will achieve its objectives through four calls, addressing all the bioeconomy sectors from the sustainable exploration of the oceans and seas and the development of a blue economy, to climate-smart agriculture, new models for development in rural areas, new biobased goods and services:

1. *Sustainable Food Security* – Resilient and resource-efficient value chains: this call addresses the issues of resilience and efficiency in the food value chain. It will support research and innovation all along the food chain, from primary production, food processing to healthy and safe foods and diets.

2. *Blue Growth* – Demonstrating an ocean of opportunities: this call will test, demonstrate, scale-up and bring to the market innovative marine and maritime technologies, products and services, as well as exploring the interactions between the oceans and human health, and strengthening the European capability to observe and map oceans and seas basins and improving the professional skills and competences for those working and being trained to work within the blue economy.

3. *Rural Renaissance* – Fostering innovation and business opportunities: this call will focus on innovation as driver for rural development, with a particular emphasis on developing framework conditions for innovation and new business models adapted to the rural context, and support for skills development in rural communities.

4. *Bio-based innovation for sustainable goods and services* – Supporting the development of a European Bioeconomy: this call will help to securing sustainable biomass supply for bio-based goods and services and will support the future development of bio-based markets, for example by promoting stakeholder engagement.

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To permeate the systems and the primary sectors at large in view of the many new challenges and to take advantage of the potential in many domains, innovation will be supported following the interactive innovation approach. The interactive innovation approach under the agricultural European Innovation Partnership [1] (EIP-AGRI [2]) fosters the development of research into practical applications and the creation of new ideas thanks to interactions between actors, the sharing of knowledge and effective intermediation. In this interactive innovation model, building blocks for innovation are expected to come from science, but also from practice and intermediaries, such as farmers, advisors, businesses, NGOs, etc. Key for interactive innovation is to include existing (sometimes tacit) knowledge into scientific work: end-users and practitioners are involved, not as a study-object, but in view of using their entrepreneurial skills and practical knowledge for developing the solution or opportunity and creating co-ownership. Innovation generated with an interactive approach tends to deliver solutions that are well adapted to circumstances and easier to implement since the participatory process is favourable to speeding up the acceptance and dissemination of the new ideas. In short, the focus of interactive innovation is: "an idea put into practice with success" because a new idea turns into a genuine innovation only if it is widely adopted and proves its usefulness in practice. The interactive innovation model is implemented in this Societal Challenge through "multi-actor" project topics. With a view to complementarity, multi-actor projects may connect with EIP Operational Groups funded under the rural development programmes (RDPs[3]). These groups are also following the interactive innovation model and work project-based in a specific Rural Development programming area (region or Member State). The topics flagged with the multi-actor approach[4] should meet all of the following requirements:

- The **multi-actor approach** aims at more demand-driven innovation through the genuine and sufficient involvement of various actors (end-users such as farmers/farmers' groups, fishers/fisher's groups, advisors, enterprises, etc.) all along the project: from the participation in the planning of work and experiments, their execution up until the dissemination of results and a possible demonstration phase. The adequate choice of key actors with complementary types of knowledge (scientific and practical) should be reflected in the consortium and in the description of the project concept, and result in a broad implementation of project results. The multi-actor approach is more than a strong dissemination requirement or than what a broad stakeholders' board can deliver: it should be illustrated in the project proposal with sufficient quantity and quality of

[1] The establishment of European Innovation Partnerships (EIPs) represents a new approach under the Europe 2020 Strategy to speed up innovation through co-operation, and by linking existing instruments and policies.

[2] http://ec.europa.eu/eip/agriculture/

[3] R.1305/2013 Art. 55-57 and Art 35

[4] See topics SFS-1, SFS-2, SFS-4, SFS-6, SFS-7, SFS-8, SFS-9, SFS-10, SFS-11, SFS-15, SFS-16, SFS-17, SFS-20, SFS-26, SFS-27, SFS-28, SFS-30, SFS-34, SFS-37, SFS-39, SFS-42, SFS-48, RUR-1, RUR-2, RUR-4, RUR-5, RUR-6, RUR-7, RUR-8, RUR-9, RUR-10, RUR-11, RUR-12, RUR-13, RUR-14, RUR-15, RUR-16

knowledge exchange activities and a clear role for the different actors in the work. This should generate innovative solutions that are more likely to be applied thanks to cross-fertilisation of ideas between actors, co-creation and generation of co-ownership for eventual results. A multi-actor project proposal needs to demonstrate how the project proposal's objectives and planning are targeted to needs / problems and opportunities of end-users, and its complementarity with existing research and best practices. The project should result in some practical knowledge which is easily understandable and accessible, and substantial in qualitative and quantitative terms. As a minimum, this material should feed into the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability' for broad dissemination as 'practice abstracts' in the common EIP format for practitioners[5]. Facilitation/mediation between the different types of actors and involvement of relevant interactive innovation groups operating in the EIP context, such as EIP Operational Groups funded under Rural Development Programmes, are strongly recommended. For projects on fisheries, aquaculture, marine and inland water issues or other areas not covered by the EIP-AGRI[6], other similarly effective solutions for dissemination should be explored.

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Many of the challenges addressed in this Work Programme are of global nature, requiring the development of global solutions in cooperation with third countries and relevant international organisations or initiatives. International cooperation will be further encouraged and seek to maximise the benefits of collaboration with regions outside the EU in particular in view of solving common problems and meeting international commitments. Particular priorities for international cooperation are:

- *Blue Growth,* which will support the implementation of the Atlantic Ocean Research Alliance (focus on Arctic) and the BLUEMED Initiative on marine and maritime research and innovation activities in the Mediterranean area;
- *Sustainable Food Security*, which will support flagships initiatives with China and partnerships initiatives with East-Asian countries on aquaculture and Africa on Food and Nutrition Security, Sustainable Agriculture and the establishment of an International Research Consortium on animal health

Public-Private Partnerships are an important element related to the overall implementation of Societal Challenge 2 objectives. As for 2014-2015, this Work Programme activities are complemented by the Joint Technology Initiative on Bio-based Industries (JTI BBI).

[5] *The EIP common format for "practice abstracts" is available at:* https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format

[6] For the areas of innovative action of the EIP-AGRI, see EIP Commission Communication COM(2012) 79 final, section 8

Public-Public Partnerships are also an important element of this Work Programme, in view of strengthening the European Research Area in the Bioeconomy areas, by seeking synergies, leverage, rationalisation and alignment on streamlined research priorities with Member States.

To further widen participation, this Work Programme will foresee dedicated actions, as well as synergies with regional research and innovation programmes through the European Structural and Investment Funds in connection with smart specialisation strategies.

The concept of Responsible Research and Innovation (RRI) underpins this work programme, aiming to align research and innovation to the values, needs and expectations of society. This means that a wide diversity of stakeholders and actors are engaged to work together in: science education; the definition of research agendas; the conduct of research; the access to research results; and the application of new knowledge in society- in full respect of gender equality, the gender dimension in research and ethics considerations. Whether the focus is on multi-actor involvement or on citizen engagement, the approach chosen should be reflected in the methodological description of project proposals, i.e.: i) the types of actors/stakeholders to be engaged, ii) the type of engagement process sought[7], iii) if relevant the desired geographical coverage/EU dimension and need for a multilingual approach, iv) the objective(s) of the engagement process, and v) the policy relevance of its outcomes. A multi-actor approach should be accompanied with the necessary resources and expertise so that it may generate impact and innovative solutions.

Gender dimension of research: This work programme includes topics where it is relevant to look at the gender dimension in research content. Research and innovation activities should explore, analyse, and address possible sex and gender differences[8] and take into account biological characteristics as well as the evolving social and cultural features of women and men, and other relevant factors of diversity (e.g. user/consumer preferences and needs) in a given context. Where relevant, sex and gender analysis should therefore be included in the planned research.

Furthermore, inputs from the Social Sciences and Humanities will be relevant to tackle the complex challenges addressed in the 2016-2017 Work Programme for Societal Challenge 2. Such inputs are therefore also requested explicitly in a number of call topics.

Several topics refer to interdisciplinary[9] or transdisciplinary[10] approaches. These should be interpreted in the following manner:

- Interdisciplinary projects involve closer and more frequent collaborative exchanges among researchers drawn from different fields who are working together on a common

[7] e.g. face-to-face and/or on-line, consultative, deliberative, participatory research/co-creation, citizen science, etc.

[8] For guidance on methods of sex / gender analysis, please refer to: http://ec.europa.eu/research/swafs/gendered-innovations/index_en.cfm

[9] SFS-19, SFS-37, SFS-39, SFS-40, BG-3, BG-4, BG-5, BG-9 and BG-13

[10] SFS-6, SFS-16, SFS-21, SFS-26, SFS-27, SFS-28, SFS-29, SFS-30, SFS-36, BG-6 and BG-11

problem (Rosenfield, 1992). Interdisciplinary research is a collaboration of several disciplines, but in this case concepts, methods, or epistemologies are explicitly exchanged and integrated, resulting in a mutual enrichment.

- Transdisciplinary projects are those in which researchers from different fields not only work closely together on a common problem over an extended period but also create a shared conceptual model of the problem that integrates and transcends each of their separate disciplinary perspectives. Transdisciplinary is a specific form of interdisciplinarity in which boundaries between and beyond disciplines are transcended and knowledge and perspectives from different scientific disciplines as well as knowledge from societal stakeholders are integrated.

Several topics include a suggestion for proposed projects to coordinate with other projects financed under the same or related topics. Such coordination allows organising cluster of projects which work on similar issues, to avoid duplication of efforts and to enable cross-fertilisation and synergies. Such coordination activities are very limited in terms of scope and resources allocated but taking them into consideration ensures eligibility of time spent in coordination or organisation of joint events.

Proposers are encouraged to use FIWARE for some or all of their platform developments, when relevant. FIWARE enablers are available at www.fiware.org under open source licence for business use. Free online training, a sand-box environment and technical support are available; equally, proposers may contribute to the evolution of FIWARE.

Proposers are advised to consult information on the Copernicus programme in general at http://copernicus.eu, the evolution topics identified there, as well as the availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data at the Commission's web http://ec.europa.eu/growth/sectors/space/research/index_en.htm. When possible proposers are encouraged to use as well the Earth Observation Data Warehouse (http://copernicusdata.esa.int/web/cscda/home) and Sentinel satellite data (http://data.copernicus.eu).

To promote pan-European coherence and interoperability, integrate the results of the different activities and facilitate international co-operation, the activities related to earth observation data and other spatial data should at best comply with and build upon the existing Infrastructure for Spatial Information in the European Community (INSPIRE) (http://inspire.ec.europa.eu/).

A novelty in Horizon 2020 is the Pilot on Open Research Data which aims to improve and maximise access to and re-use of research data generated by projects. Projects funded under the following topics will by default participate in the Pilot on Open Research Data in Horizon 2020:

Call H2020-SFS-2016/2017

SFS-10-2017 Research and approaches for emerging diseases in plants and terrestrial livestock

SFS-14-2016 Understanding Host-Pathogen Interactions

SFS-20-2017 Towards a science-based regionalisation of the Common Fisheries Policy

SFS-21-2016/2017 Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species

SFS-23-2016 Improving technical performance of the Mediterranean aquaculture

SFS-27-2017 Permanent grassland – farming systems and policies

SFS-28-2017 Functional Biodiversity – Productivity gains through functional biodiversity – effective crop pollinators and pest predators interplay

SFS-29-2017 Socio-Eco-Economics – Socio economics in ecological approaches

SFS-31-2016 Farming for tomorrow: developing an enabling environment for resilient and sustainable agricultural systems

SFS-32-2017 Promoting and supporting eco-intensification of aquaculture production systems: inland (including fresh water), coastal zone and offshore

SFS-33-2016 Understanding food value chain and network dynamics

SFS-34-2017 Innovative agro-food chains: unlocking the competitiveness and sustainability potential

SFS-35-2017 Innovative solutions for sustainable food packaging

SFS-36-2017 Co-fund on "One Health" (zoonoses – emerging threats)

SFS-37-2016 The impact of consumer practices in food safety: risks and mitigation strategies

SFS-38-2016 Impulsivity and compulsivity and the link with nutrition, lifestyle and the socio-economic environment

SFS-39-2017 How to tackle the childhood obesity epidemic?

SFS-40-2017 Sweeteners and sweetness enhancers

SFS-44-2016: A joint plant breeding programme to decrease dependency of the EU and China on protein imports

Call H2020-BG-2016/2017

BG-03-2016 Multi-use of the oceans marine space, offshore and near-shore: compatibility, regulations, environmental and legal issues

BG-06-2017 Interaction between humans, oceans and seas: a strategic approach towards healthcare and wellbeing

BG-08-2017 Innovative sustainable solutions for improving the safety and dietary properties of seafood

BG-09-2016 An integrated Arctic observing system

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

BG-11-2017 Climate impacts on Arctic permafrost, with a focus on coastal areas, and its socio-economic impact

BG-12-2016 Towards an integrated Mediterranean Sea Observing System

BG-13-2016 Support to the BLUEMED Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean

Call H2020-RUR-2016/2017

RUR-01-2016 Consolidated policy framework and governance models for synergies in rural-urban linkages

RUR-03-2017 Towards 2030: Policies and decision tools for an integrated management of natural resources

RUR-04-2016 Water farms – Improving farming and supply of drinking water

RUR-05-2017 Novel public policies, business models and mechanisms for the sustainable supply of and payment for forest ecosystem services

RUR-06-2016 Crop diversification systems for the delivery of food, feed, industrial products and ecosystems services: from farm benefits to value-chain organisation

RUR-07-2016 Resource-efficient and profitable industrial crops on marginal lands

RUR-09-2017 Business models for modern rural economies

RUR-11-2016 On farm demonstrations: deepening farmer-to-farmer learning mechanisms

RUR-12-2017 Networking European farms to boost thematic knowledge exchanges and close the innovation gap

Call H2020-BB-2016/2017

BB-01-2016 Sustainability schemes for the bio-based economy

BB-02-2017 Towards a methodology for the collection of statistical data on bio-based industries and bio-based products

BB-03-2017 Adaptive tree breeding strategies and tools for forest production systems resilient to climate change and natural disturbances

BB-05-2017 Bio-based products: Mobilisation and mutual learning action plan

BB-06-2016 Bio-based industries regional dimension.

Projects funded under the other topics of this Work Programme may participate in the Open Research Data Pilot in Horizon 2020 on a voluntary basis.

Projects have the possibility to opt out of the Pilot under certain conditions. Participation in the Pilot is not taken into account during the evaluation procedure. In other words, proposals will not be evaluated favourably because they are part of the Pilot and will not be penalised for opting out of the Pilot.

A further new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The use of a DMP is required for projects participating in the Open Research Data Pilot. Other projects are invited to submit a DMP if relevant for their planned research. Only funded projects are required to submit a DMP.

Further guidance on the Pilot on Open Research Data and Data Management is available on the Participant Portal.

Finally, several horizontal activities on valorising research outcomes, engaging with society, strengthening the European Research Area as well as projects targeting SMEs will be promoted.

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

H2020-SFS-2016-2017

INTRODUCTION

There are major challenges to the supply and quality of food and animal feed, of both terrestrial and aquatic origin. These challenges stem from a wide range of interrelated factors, e.g. climate change, natural hazards, energy and resource scarcity, inappropriate agricultural and fishing practices, marine and land degradation, plant and animal diseases, unsustainable manufacturing processes, food waste, population growth, demographic changes and unsustainable dietary patterns. Collectively, they threaten food security[11] and the health and well-being of people in the EU and around the world.

Research and innovation are vital to understanding, minimising and coping with risks to food security and to creating new production, processing and consumption models.

The focus area 'sustainable food security' will put greater emphasis on the resilience of primary production, coping with resource depletion and climate change, and research and innovation along the food value chain than the previous work programme (2014–2015). From a demand-side perspective, it will also highlight sustainable and healthy consumption and lifestyles. This focus area has been aligned with the Commission's strategic guidelines and with the need to provide evidence-based support for relevant EU policies such as plant health or food safety.[12]

The vast majority of research in Europe is funded at national level. It is therefore important that support for transnational coordination on national and regional research programmes continues to consolidate the European Research Area, and streamlines the required research activities. The Framework Partnership Agreement for implementing ERA-NET Cofund projects is designed to strengthen and simplify cooperation between the European Commission and the Member States and to support more strategic collaboration between research programme managers.

This focus area has four sub-areas:

[11] 'Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (definition agreed at the World Food Summit 1996).

[12] Actions in the focus area will support the EU food security strategy. This comprises the Europe 2020 Resource-efficient Europe Flagship, the EU Biodiversity Strategy to 2020, the EU Soil Thematic Strategy and other elements of the EU Environmental Policy, the European Innovation Partnership 'Agricultural productivity and sustainability', the post-2015 Development Cooperation Agenda, The Common Fisheries Policy, the Common Agricultural Policy and EU health and consumer policy.

- More resilient and resource efficient value chains
- Environment-smart and climate-smart primary production
- A competitive food industry
- Healthy and safe foods and diets for all

and two areas focussing on international cooperation:

- Support to the implementation of the EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture
- Implementation of the EU-China Food, Agriculture and Biotechnology Flagship initiative and EU-South East Asian cooperation around aquaculture.

This focus area is particularly suitable for international cooperation, as the EU has leading expertise in sustainable food production and access to the resources of truly international organisations. In terms of international cooperation, it will reinforce the role of the EU as a strong global actor, in particular in the Mediterranean region, Africa, China and South-East Asia (aquaculture).

Wherever possible, proposers may seek synergies, including possibilities for funding, with relevant national/regional research and innovation programmes and/or cumulative funding with European Structural and Investment Funds (ESIF) in connection with research & innovation smart specialisation strategies (RIS3).

Proposals are invited under the following topic(s):

MORE RESILIENT AND RESOURCE EFFICIENT VALUE CHAINS

Proposals are invited against the following topic(s):

SFS-01-2016: Solutions to multiple and combined stresses in crop production

Specific Challenge: Water, soil quality and nutrients are key determinants of plant growth and crop productivity. With supplies of these inputs becoming increasingly variable and scarce, improvements in water use efficiency (WUE) and nutrient use efficiency (NUE) are of particular importance for both plant breeding and crop management, as are issues of yield stability.

Scope: Proposals will lay the ground for a better understanding and management of highly dynamic processes of combined abiotic variations and their effects on crops. More specifically, activities will establish how combined water and nutrient stresses act upon plants

taking into account complex interactions between plants/roots, soils and below ground biodiversity. Knowledge of these basic processes should be linked to overall system resource-use efficiency in crops on the basis of a thorough understanding of the interplay between crop genetics, crop management and the environment. Findings will be applied to the development and testing of strategies and tools for soil, water and crop management. Also, they will serve to identify (combinations of) above- and below-ground traits associated with improved plant performance under restricted water and nutrient availability to develop crop breeding strategies and tools.

Proposals should fall under the concept of the 'multi-actor approach'[13] to ensure that knowledge and needs from various sectors including farming are brought together. The topic is open to all types of crop production and farming systems (e.g. arable farming, horticulture, grassland, fruit trees, agro-forestry) and should benefit both conventional and organic agriculture in various pedo-climatic conditions.

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

Expected Impact: Activities will enhance our capacity to deal with multiple abiotic stresses in cropping systems. More specifically project outputs will serve to

- reveal how different combinations of water and nutrient stresses interact and impact on crops, in particular on agriculturally important traits;
- increase the range of farm-level crop management strategies and tools to respond better to variable levels of water and nutrient supply;
- support breeding strategies and tools to develop crops that can adapt better to water and nutrient stresses and ensure high product quality;
- identify combinations of genotypes and management practices suited to increase water and nutrient use efficiency of crops (this could include exploiting the natural variation e.g. in traditional crops).

More generally and in the long term, outputs and results will help to increase the resilience of crop production in more variable environments and ultimately secure productivity. They will also contribute to optimising water use and reducing nutrient losses in agricultural systems, thereby also reducing the environmental impact of agricultural activities, in particular with regard to water quality.

Type of Action: Research and Innovation action

[13] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-02-2016: Teaming up for good: Exploiting the benefits of species diversity in cropping systems

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

Scope: Activities will help to unravel the mechanisms underlying beneficial plant interactions in cropping systems and lead to a better understanding of the dynamics between plants and their biotic and abiotic environments. Proposals will turn this knowledge into practical applications for breeding and crop management taking into account the corresponding changes in agronomic and breeding practices. Activities should fall under the concept of the 'multi-actor approach'[14] and ensure that appropriate account is taken of scientific, farming, agronomic and breeding expertise throughout the work with due attention to participatory and demonstration activities: All types of crop production and farming systems (e.g. arable farming, horticulture, grassland, fruit trees, agro-forestry), and diverse pedo-climatic conditions in Europe can be covered. Work proposed shall benefit both conventional and organic agriculture. International cooperation is encouraged wherever it adds value to achieving the objectives of the proposed work.

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

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

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

- scientifically supported and field tested evidence on the mechanisms underpinning beneficial crop associations and their effects on crop performance and product quality;

[14] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- increasing farmers' and breeders' knowledge of potential benefits of 'plant teams' (e.g. with regard to resource facilitation, pest and disease restriction/control);
- promoting diversity-rich crop management practices;
- increasing the availability of plant varieties suited for inclusion in crop associations and mixtures including traditional varieties.

In the longer term, results will support yield stability and diversification in the primary sector, increase resilience against environmental fluctuations and support healthier diets. They may also enhance ecosystem services associated with increased agro-biodiversity.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-03-2016: Testing and breeding for sustainability and resilience in crops

Specific Challenge: Agriculture is facing major challenges such as the need to improve resource use efficiency, reduce dependency on external inputs and cope with more variable climatic conditions. The farming sector is increasingly expected to produce “more with less” and to move towards more sustainable practices. Breeders need to consider more systematically characteristics that respond to these demands and contribute to crop resilience, particularly to increasing biotic and abiotic stresses. Similarly, criteria and methods for testing the value of cultivation of new varieties need to further evolve to capture better the performance of new varieties in conditions associated with sustainable and more variable farming practices.

Scope: Proposed work will help to identify crop characteristics and "sustainability criteria" that are associated with the capacity of new varieties to yield under more variable conditions and under more sustainable crop management practices (e.g. with regard to the use of fertiliser, water or plant protection products). Work will serve to develop methods and tools to integrate sustainability criteria in the testing and evaluation of new varieties taking into account a range of agro-ecological environments, soil types and on-farm conditions. Furthermore, work will advance the development of field based phenotyping tools and protocols to increase robustness of testing methods and allow better prediction of Gene x Environment interactions.

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

Expected Impact: Activities will support the introduction of new varieties that are “fit for purpose” as regards meeting demands for high(er) yields but also to show greater robustness

and adaptability to changing conditions, in particular varying levels of biotic and abiotic stresses (including decreasing levels of external inputs). This will benefit the introduction of plant properties that respond to new challenges and demands while also taking into account growers' economic returns. More specifically, activities will contribute to

- a better understanding of crop-specific characteristics underpinning efficiency, tolerance and resilience to more challenging climatic and production environments
- the development of experimental designs, methodologies and tools to improve capture and prediction of the sustainability profile of new varieties
- improving information and recommendations on variety performance available to growers
- the use of better adapted and more adaptable varieties

In the longer term, the availability and use of more robust and "sustainability-proof" varieties are expected to support changes in agricultural practices, i.e. enable the farming sector to remain productive while using resources and external inputs more efficiently. Results will also boost innovation in the breeding sector through the delivery of new varieties with clearly demonstrable advantages.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-04-2017: New partnerships and tools to enhance European capacities for in-situ conservation

Specific Challenge: *In situ* (including on-farm) conservation is an important complement to *ex situ* conservation efforts and particularly relevant for tackling Crop Wild Relatives (CWR) and landraces. Unlike the more static conservation of genetic material in gene banks, *in situ* conservation is seen as a means of capturing the evolutionary adaptation of plants exposed to changing environmental and management conditions, thereby providing a reservoir of valuable traits for crop adaptation (including to climatic changes). To be effective, *in situ* conservation strategies require a complex multi-actor approach and need to be embedded into overall strategies to preserve plant genetic resources.

Scope: Activities will help to build (a) network(s) of *in situ* (including on-farm and on-garden) conservation sites and stakeholders in order to develop new partnerships between the conservation, farming, gardening and breeding sectors and with the wider public. This will expand 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 enhance knowledge of available resources, support the demonstration of *in situ* genetic resources to the wider public and improve access to this genetic reservoir.

Exchanges with the breeding sector will provide openings to identify promising traits from landraces and CWRs and increase their use in breeding. Activities will also contribute to developing and showcasing strategies for *in situ* conservation and to linking *ex situ* and *in situ* conservation efforts more effectively. While targeting in particular European capacities, projects are encouraged to draw on good examples from elsewhere. The work is expected to benefit from the contribution of social sciences. Proposals should fall under the concept of the 'multi-actor approach'[15].

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

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

- greater knowledge of the status and characteristics of *in situ* genetic resources in Europe
- establishing more durable partnerships between *in situ* conservation stakeholders and thus to more dynamic transfer of plant material and good practice on conservation and management issues
- the creation of a platform 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

In 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: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-05-2017: Robotics Advances for Precision Farming

Specific Challenge: The specific challenge here is to help attain high levels of precision in modern farming through the smart use of robotics. The technological challenge is to develop and demonstrate new robotics technologies in real-world scenarios involving such as

[15] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

automated mobility around irregular farmland areas, accurate sensing of crop and livestock conditions, and dextrous manipulation of farmed produce. Farming is facing many economic challenges in terms of productivity, cost-effectiveness and increasing labour shortage. Precision farming automation will increase farm productivity, reduce manual labour for laborious tasks and help to make farm holdings more sustainable. Many modern farmers already use high-tech solutions, e.g. digitally-controlled farm implements and even unmanned aerial vehicles. There are partially and fully automatic devices for most aspects of agricultural functions from grafting to seeding and planting, from harvesting to sorting, packaging and boxing, and livestock management. However, current systems still have significant drawbacks, in particular in terms of flexibility, efficiency, robustness, high operator cost and capital investment.

Precision farming using robotics technology applied to existing systems on a 1:1 scale where appropriate (the scale may differ according to the specific agricultural application) can lead to more resource-efficient and environment-friendly agricultural production. Roboticised precision farming not only promises to increase yields by optimising growth and harvesting processes, but could also lead to lower fertiliser and pesticide usage and improved soil quality through more targeted interventions. Robots can also gather operational data on a broader basis than human-operated devices. However, there is insufficient cross-over between emerging generic advances in field robotics and the more specific, practical needs of the modern farming community.

Scope: Research and Innovation Actions will focus on the design, development and testing of robotics systems for precision farming, including autonomous or semi-autonomous farm vehicles or sophisticated sensors and intervention mechanisms. The actions will prioritise technologies such as selective harvesting, more targeted weed reduction or environment friendly fertilization, and / or livestock management, based on better planning and targeted intervention, using sensors (local and aerial, even maybe earth observation satellite). This will also allow the tagging of agricultural produce or livestock for better traceability and subsequent big data processing, optimizing the whole agricultural process.

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- significant increase in farm productivity with more environment-friendly processes (e.g. reduced water use, toxic substance use and soil compaction);
- increase in the safety, reliability and manageability of agricultural technology, reducing excessive human burden for laborious tasks.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-06-2016: Weeding - strategies, tools and technologies for sustainable weed management

Specific Challenge: Herbicides account for over a third of the pesticides used in Europe and, with fungicides, for the highest sales in Europe[16]. Given the objective of the Sustainable Use of Pesticides Directive[17] (to "reduce the risks and impacts of pesticide use on human health and the environment and promote the use of integrated pest management and of alternative approaches or techniques such as non-chemical alternatives to pesticides") weed management plays a key role in farmed ecosystems. Closely related to soil management, weeding techniques impact also the soil quality and can contribute to carbon sequestration. Alternative strategies are needed that will limit or eliminate the use of herbicides, manage herbicide resistance and enhance soil carbon stocks. Approaches ranging from prevention strategies, including crop diversification and biological control, to precision farming and automated selective mechanical engineering (e.g. weeding robots) could be developed in an integrated approach. Farmers' willingness to adopt new weed management strategies is a particular challenge, due to their risk aversion and their perceptions of the implementation of these new weeding strategies and their impact on weed seed-bank on the medium and long term.

Scope: Proposals should set out innovative and effective strategies for improving weed management in different arable and horticulture (i.e. vegetable and fruit including perennial crop) systems. They will develop and validate novel strategies, machinery, tools and technologies for weed management that meet the demand for more environmentally sustainable approaches. Work should take due account of the labour constraints and risk management for farmers and other socio-economic dimensions of the solutions proposed. Synergies and trade-offs between different environmental issues will be analysed. The consequences of novel weed management strategies, tools and technologies for ecosystem services and wider biodiversity will be assessed. Proposals are expected to cover both conventional and organic sectors (including conservation tillage systems). Transdisciplinary research, including input from social sciences and the humanities, should be applied to maximise impact. Proposals should fall under the concept of the 'multi-actor approach'[18] to ensure effective collaborations between stakeholders e.g. from farming, research and industry (incl. machine industry). In line with the objectives of the EU's strategy for international cooperation in R&I, proposals are encouraged that draw on good examples from outside Europe and involve relevant third country participants.

[16] Eurostat: http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_consumption_of_pesticides#Further_Eurostat_information

[17] http://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides/index_en.htm

[18] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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

Expected Impact:

- transfer to the farming community of scientific knowledge regarding weed control, e.g. new integrated weed management strategies and decision tools;
- more efficient and viable weed control techniques for organic and conventional farming;
- reduced environmental impact of weed control: improved ground- and surface-water quality, reduced threats to biodiversity and wildlife, including in-field and in soils, protected and enhanced soil carbon stocks;
- strengthening of transdisciplinary research and use of the multi-actor approach to ensure long-lasting implementation of the results obtained; and
- provision of scientific support for relevant EU policies[19].

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-07-2016-2017: Organic breeding – Increasing the competitiveness of the organic breeding and farming sectors

Specific Challenge: The availability of organic seeds and varieties is an economic and technical challenge for organic producers. The current EU regulation requires that seed and propagation material used in organic farming is produced organically. However, it is estimated that more than 95% of organic production is based on crop varieties that were bred for the conventional sector and consequently lack important traits required under organic and low-input production conditions. As a consequence, there is a system of derogations to deal with the lack of organic seeds on the market. Significant seed multiplication and breeding efforts are needed to increase the availability of organic seeds not only to meet legislative requirements but also to improve the performance of the sector through varieties which are better suited to specific conditions of organic farming.

Scope: Proposals will involve a range of measures to increase the availability of organic seeds, develop a comprehensive breeding strategy and initiate the breeding of varieties which are suited for organic farming. They will provide a detailed view of the current situation in

[19] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides

EU Member States as regards the availability and registration of seeds as well as opportunities and constraints to organic breeding and seed market development. Proposals will develop solutions in response to the gaps and bottlenecks identified. Furthermore, work will include identifying relevant (combinations of) traits suited to organic farming conditions, as well as testing existing varieties for organic production, and boost breeding activities for the organic sector. Proposed work will be based on partnerships between the breeding, farming and research sectors and fall under the concept of the multi-actor approach[20]. Particular attention will be given to demonstration, testing and training activities in particular in EU Member States where the organic sector is less developed and has particular needs. The topic is open to all types of organic farming systems (e.g. arable farming, horticulture including aromatic and herbs, fruit trees, grasslands, mixed) in various geographical and pedo-climatic and conditions. Selected projects will be requested to work together closely in particular with a view to developing information tools.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 8 million in 2016 and of up to EUR 6 million in 2017 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Activities will contribute significantly to improving the availability and quality of seeds for organic farming, and thus achieving the regulatory 100% organic seed target. They will contribute to:

- increased transparency in the EU organic seed market;
- improved access to a wider pool of high-quality seeds for the organic farming sector;
- more harmonised registration approaches for organic seed in the EU;
- efficient seed multiplication methods and breeding approache;s
- the availability of tools and resources for pre-breeding and breeding;
- implementation of legislative requirements.

In the medium to longer term, activities will help to increase competitiveness of the organic breeding and farming sectors throughout Europe and beyond. They will foster low-input agriculture, sustainability of farming practices and quality of products which meet consumer expectations. Conventional systems will also benefit from varieties which are better adapted to lower resource inputs and are more resilient to variable environmental conditions.

Type of Action: Research and Innovation action

[20] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-08-2017: Organic inputs – contentious inputs in organic farming

Specific Challenge: Despite having stricter standards and limitations on external inputs, organic agriculture still uses a number of products that are allowed under the EU organic regulation only due to a lack of economically and technically viable alternatives. Some are the subject of concern or not fully in line with organic principles. The most controversial practice in this respect is the use of copper as a plant protection product, but there is also an urgent need for alternatives to the use of mineral oils (for plant protection), manure from non-organic farms, synthetic vitamins and provitamins used in animal production, etc. Work needs to be done to develop alternatives to such contentious inputs, including preventive farm-management methods.

Scope: Projects should provide a comprehensive overview of the current use of and need for external inputs in various types of organic plant and animal farming systems. Activities proposed should be aimed at reducing or gradually phasing out contentious inputs without compromising the competitiveness of the organic sector. Work shall identify and develop alternatives to contentious inputs and analyse the socio-economic conditions required for their adoption. The products and management practices developed should be tested in different pedo-climatic and farming conditions in the EU, allowing for wide geographical coverage within Europe, associated countries and relevant third countries. Projects should take into account the results and conclusions of previous research projects in the area. Proposals should fall under the concept of the 'multi-actor approach'[21].

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

Expected Impact:

- widely accessible and cost-efficient alternatives to contentious inputs in organic farming. Better knowledge of alternatives will also allow for reduced inputs in conventional agriculture;
- enhanced organic production, quality and stability;
- reduced environmental impact of organic and low-input farming systems;
- fair, reliable and implementable rules on the use of inputs in organic production; and
- provision of scientific support for relevant EU policies.

[21] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-09-2016: Spotlight 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 potential consequences are major and could result in significant yield losses and costly control measures not just in olive trees but also in other economically important crops such as grapes, citrus fruits, stone fruits and almonds. A recent EFSA scientific opinion has confirmed the significant threat to plant health and European agriculture posed by the pest, amongst others because of *X. fastidiosa's* high levels of genetic plasticity and the fact that hosts can be infected without displaying any symptoms.

Scope: Proposals will set out a comprehensive package of research and innovation actions to improve the prevention, early detection and control of *X. fastidiosa* in hosts and vectors. They shall increase knowledge on the biology of the pathogen and vector(s), on host/vector/pathogen interaction and epidemiology. Work shall target both the Apulian strain of *X. fastidiosa* and other strains that could represent a serious risk in the EU. Practical guidelines and integrated solutions for crop and disease management shall be developed to detect early, control outbreak and prevent spread of the disease in conventional and organic farming systems. Prevention measures should consider the introduction and spread of *X. fastidiosa* within and from outside the EU. Activities will support the development of region-specific risk assessment and eradication plans. Proposals should fall under the concept of the 'multi-actor approach' [22], ensuring solid collaboration between research, plant health authorities and farming sector. International collaboration is highly encouraged with partners from Third Countries affected by the pest in particular to capitalise on existing knowledge. Activities should also take into account ongoing and/or recent work, e.g. funded under the EUPHRESCO ERA-NET.

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

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

[22] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- gain more detailed knowledge in particular on the relevant European strain(s) of *Xylella fastidiosa* along with its hosts and vectors;
- develop validated and harmonised methods and tools for early detection, treatment and control;
- establish more effective mechanisms and tools for risk assessment and prevention, as well as guidelines for eradication;
- provide the farming sector with adequate information and tools to tackle the disease throughout the agronomic cycle in various agro-ecological conditions;
- inform breeding activities for more resistant plant varieties.

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

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-10-2017: Research and approaches for emerging diseases in plants and terrestrial livestock

Specific Challenge: Trade and the movement of goods and people have facilitated the transfer and spread of plant and animal diseases, the prevalence of which is expected to increase further as a result of intensification, changes in agricultural practices and climatic variations. Emerging diseases in plants or terrestrial animals can be a substantial impact on agricultural and forest productivity, trade and public health. Appropriate and rapid responses by decision-makers need to be informed by scientific evidence, addressing as far 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 understanding the drivers of disease emergence and 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 of the pests and diseases threatening EU agriculture/forestry (regulated or non-regulated, invasive or native) and causing significant economic losses. The choice of target species should consider the potential threat in terms of development and spread as well as potential impact on agricultural production, public health, or trade. Proposals should increase knowledge on the biology of the pest(s) as well as on the development and spread of the disease(s). They should improve methods and strategies for risk assessment, prevention and containment and enlarge the range of tools for integrated and sustainable pest/disease

management. International cooperation with countries affected or threatened by the same pest(s)/disease(s) is encouraged. Proposals should fall under the concept of the 'multi-actor approach' [23] and be based on the active participation of stakeholders from research, plant/animal health authorities and the farming and business sectors. Partners from non-EU regions particularly affected by the targeted pests and disease(s) should also be involved. As regards livestock, proposals should contribute as appropriate to the objectives of the STAR-IDAZ international research consortium (see SFS-12-2016). They should involve cooperation as appropriate with relevant initiatives, e.g. in the context of such as EUPHRESCO and STAR-IDAZ, and other funded projects in this field, e.g. those selected under SFS-14-2016.

Individual proposals should tackle either plant or animal diseases. Funding will allow for support for up to two projects on plant diseases and one animal diseases.

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

Expected Impact: Knowledge and solutions generated by this action should contribute to:

- understanding drivers for pest and disease emergence
- improved management of infectious diseases in plants or terrestrial animals by the farming and forestry sectors;
- development of environmentally sound tools for the prevention, detection and diagnosis, of plant and animal pests and diseases;
- reduction of economic losses by the farming and forestry sectors;
- improved food quality and food safety; and
- implementation of EU plant and animal health policies.

In the longer term, project outputs will help the agricultural sector to remain productive and contribute to food security.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[23] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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[24] particularly hard, especially in uniform plantings. Overall, losses are thought to be 50 to 100% higher in tropical than in temperate regions; estimates of the former range from 30 to 50%.The effects of increased climatic variation are expected to further increase the occurrence of pests and diseases as well resistance against crop protection measures. This threatens to affect the production of many economically important crops and the incomes of small holders in particular.

Scope: The work proposed will develop integrated approaches to the 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 and changes in farming practices. They will develop more effective and sustainable management options which are based on a holistic view of agro-ecosystems and a better understanding of the bearing that climatic changes may have on plant diseases and their management. They should propose novel solutions to improve forecasting, monitoring and information on biotic threats. Proposals should fall under the concept of the 'multi-actor approach'[25] 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 the uptake of new methods and tools in plant disease management and take into account the specificities of farming systems. International collaboration is essential to meet the requirements of the topic (see conditions for minimum number of participants under evaluation procedures in section "Conditions for the SFS call")

The Commission considers that proposals requesting a contribution from the EU of 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: Project outputs will result in an increased uptake of integrated disease management approaches. These will benefit sustainable production of important perennial crops in tropical and sub-tropical regions within Europe and elsewhere by:

- delivering applicable knowledge on the biology of pests and diseases and on the disease cycle;
- expanding the set of sustainable measures and tools available to farmers to prevent and deal with important pests and diseases;

[24] For the purpose of this topic the term "perennial crops" is used in a wide sense. It covers crops which are alive year-round, are harvested multiple times before dying and occupy the same plot for at least three years.

[25] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- reducing yield losses and stabilising production;
- enhancing capacity in conventional and low-input farming sectors (including small holder farming) to apply more complex cultural practices, e.g. in line with integrated pest and disease management principles;
- reducing reliance on critical pesticides in farming practices, thereby also supporting product quality and human health (e.g. that of applicators and consumers);
- improving capacity of plant health authorities and advisory services to prevent diseases; and
- triggering product, technology and service innovations in support of plant health and plant protection.

In the longer term projects will help to secure/increase productivity of important perennials in tropical and subtropical regions and at the same time reducing the environmental impact of agricultural activities. They will thereby strengthen the contribution of the agricultural sector to rural economies as well as overall economic and sustainable development.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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 threaten human health. An increasing number of major disease problems or threats faced by the livestock industry and zoonoses are global in scale.

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

Scope: This global initiative will consolidate and deepen international research cooperation in the area of animal health, in particular infectious animal diseases, including zoonoses and parasites, and related issues such as anti-microbial resistance. It will build on existing activities of the 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 and related issues such as anti-microbial resistance. The action will lead to the setting up of a scientific secretariat to provide organisational support for the achievement of the goals of the global infectious diseases of animals and zoonoses consortium (STAR-IDAZ) in close cooperation with the European Commission, and research-funding agencies in Member States and the third countries

involved. It will involve assisting the consortium executive committee, establishing and running 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 on 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 of up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- The project should contribute to achieving overall STAR-IDAZ goals. It will support cooperation in the consortium, including by organising 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, including anti-microbial resistance, and so hasten the delivery of new or improved control tools or strategies.
- It will support more focused effort through research gap analysis, prioritisation, and alignment of research programmes and coordination of research activities, which over five years will result in new or improved disease-control tools, including vaccines, diagnostics, therapeutics, and/or critical scientific information informing efforts to control specific target diseases.
- More generally and in the longer term, through providing support for STAR-IDAZ activities, 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 the efficiency and competitiveness of livestock production, and global food security.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-13-2017: Validation of diagnostic tools for animal and plant health

Specific Challenge: The simple, swift and reliable detection, accurate identification and proper quantification of pathogens and other factors affecting plant and animal health, including zoonotic agents, and correlates of infection (e.g. host-response biomarkers) and/or immunity are critical for the monitoring and control of their introduction or spread. These tools are essential to avoid or reduce costs to the economy, trade disruptions and sometimes

even human health risks. The methods are used not only by competent authorities (i.e. the national authorities responsible for organising official controls), but also by private laboratories or directly by veterinarians at the point of care, practitioners and business operators.

In recent years, most research efforts have focused on the developing high throughput, generic, quick and cheap methods, a number of which have been validated on an intra-laboratory basis or through limited ring trials. Before they are used outside research laboratories, these methods often have to undergo additional testing, e.g. further ring tests, development of reference materials, harmonisation or adaptation for implementation in field conditions (sampling methods, multi-targeting, pen-side tests, mobile analysis).

Scope: The projects aim to harmonise and validate (including through ring trials) existing and new protocols for the detection and quantification of pathogens and other factors of concern for the health of plants and terrestrial animals, and correlates of infection/immunity. Work will build on existing knowledge and resources, and support the further development of promising existing protocols to deliver close-to-market end-products, including swift, portable tools for field testing. Cooperation among stakeholders is encouraged to ensure the use of generic technologies for a broader spectrum of organisms. There should be liaison with EU and international reference and standardisation bodies. Projects should take due account of dissemination to relevant stakeholders to facilitate the uptake of results.

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

Expected Impact: Projects outputs will result in:

- validated protocols for the detection and quantification of pathogens and correlates of infection/immunity;
- support for plant and animal health policies in the form of validated protocols to be used by competent authorities and reference laboratories;
- the bringing to the market of end-products, such as swift, portable tools for field-testing by veterinarians, practitioners and business operators.

More generally and in the longer term, the outputs will support the improvement of animal/plant health and food safety, thus contributing to the sustainability and competitiveness of the agri-food sectors.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-14-2016: Understanding host-pathogen-environment interactions

Specific Challenge: Disease emergence and spread are the result of a number of factors linked to the infectious agent, the host, possible vectors and the environment. The virulence of the pathogen and immunological status and genetics of the host(s) are critical in determining whether the infection develops, remains, spreads or disappears and whether the animal circumvents the disease, becomes sick or a carrier, or recovers. Establishing the biological interplay between pathogen, vectors and host(s), possibly involving other microbiota and reservoir species, is key to understanding the dynamics of infections/diseases and developing control and prevention strategies. There is a growing body of evidence on the capacity of infectious agents to evolve and circumvent the host immunological reaction or treatments and profit from environmental niches; this represents a real challenge. Although modern tools facilitate the tracking of pathogens, a lot still needs to be done to extend our knowledge of the host reaction and how we can use this to develop control and prevention strategies, in particular vaccines or diagnostics, and take the related opportunity to increase the biosecurity status of livestock, which is important both for sustainable production and safe trade.

Scope: The research will improve knowledge of the pathogen-host-environment/possible vectors triangle and their interaction in the spread of major diseases affecting terrestrial livestock. It will contribute to understanding of the dynamics of the disease and the development of more effective control strategies, vaccines or other compounds increasing the host's natural defence/immunity and diagnostics. Projects should address either an epizootic disease such as potentially pandemic animal influenza (scope A) or endemic/production diseases (scope B).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5.5 million would allow this specific challenge to be addressed appropriately Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Funding will allow for support for at least one project under scope A and one under scope B.

Expected Impact: Projects outputs should contribute to the understanding of the dynamics of the diseases in question, as regards the pathogen, the host and (where appropriate) the environment. Project outputs should strengthen the evidence base for prevention and control strategies, including diagnostic, therapeutic and other policy strategies. More generally and in the longer term, the outputs will support the improvement of animal health, contributing to the sustainability and competitiveness of the agri-food sectors.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-15-2016-2017: Breeding livestock for resilience and efficiency

Specific Challenge: While increasing focus is placed on the efficiency of animal production, animal production systems also need to be resilient, at both animal and system level. For animals, this resilience needs to apply to their welfare, as well as their health. Systems may make use of local, multipurpose breeds and/or highly productive breeds and the genetic variation within breeds could be used more effectively. Enhancing animals' ability to overcome endemic and emerging diseases and nutritional, reproductive or environmental challenges will help them stay healthy and productive, i.e. increase their resilience, as a result of being better suited to their living conditions. Progress here will be key to improving resilience traits and other traits that are important for a sustainable livestock sector. The challenge for livestock breeding is to address the need for efficiency and the need for resilience, and to manage trade-offs. To accelerate progress on these issues, it is important to develop improved tools to identify, exploit and measure important genomic and phenotypic characteristics of resilience and efficiency.

Scope: The research will focus on breeding terrestrial livestock for improved resilience and efficiency. It will target efficiency and resilience related traits and possible links between them (synergies, trade-offs) to address balanced breeding goals in an agro-ecological way. Research activities should assess and exploit the potential of underutilised genetic resources (other breeds, traditional breeds and crossbreeds). The projects should address the wide genetic variation among bovine breeds linking beef cattle over dual-purposed cattle to more specialized dairy cattle and link with other EU initiatives in the cattle dairy sector (scope A, 2016) or small ruminants and/or monogastrics (scope B, 2017). Activities will further develop tools/systems/statistical methods to measure phenotypes and assess the feasibility of schemes for improving targeted livestock. Coverage of both conventional and organic sectors is expected. Proposals should fall under the concept of the 'multi-actor approach'[26]. Projects should ensure appropriate dissemination to the breeding sector and other relevant stakeholders to facilitate the uptake of results.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Scope A will be covered in 2016 and scope B in 2017.

Expected Impact: Projects should generate tools able to accurately link genomics data from farm animals to efficiency- and resilience-related traits in order to help exploit the full potential of the growing amount of recently generated genomics data. They will translate genomic information to facilitate predictive biology of efficiency- and resilience-related traits and test the new concepts in genomic selection. They will promote diversity-rich livestock breeding. More generally and in the longer term, outputs and results will help increase

[26] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

resilience of livestock production, including organic production, to more variable environments, while securing productivity.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-16-2017: Bee health and sustainable pollination

Specific Challenge: Bees (including managed and wild bees, social and solitary bees) are subject to numerous pressures in the modern world: exposure to cocktails of agrochemicals, various pathogens, lack of abundance and diversity of feed, flowers, etc., and possibly even climate change. Stressors do not necessarily act in isolation, but often in combination, and may differ between warm and cold geographical areas. Regulations and beekeeping or agricultural practices do not currently address such interactions. Even studying the interactions poses a major challenge, due to the difficulty of testing and control in natural conditions. There are gaps in our understanding of the underlying mechanisms and how to interpret them in order to discern trends and understand the natural biology of colony health how it interacts with the stress factors. Previous and on-going EU projects have sought to shed some light in particular areas. The European Food Safety Authority (EFSA[27]) and the EU reference laboratory (EURL[28]) for bee health are addressing more focused aspects of a holistic risk assessment of multiple stressors in honeybees in the MUST-B project. Nevertheless, there have been no significant breakthroughs in our ability to understand and therefore mitigate the stressors of bee health (at least not without possible detriment to other sectors), and to ensure sustainable beekeeping and/or the provision of adequate pollination services in the EU.

Scope: The research will focus on bee health and sustainable pollination, taking a transdisciplinary approach and building on and synthesising knowledge from previous EU projects, national research and existing networks, and EFSA and EURL initiatives. The projects should address the most critical obstacles to sustainable beekeeping and the provision of bee pollination services, taking account of socio-economic factors and human behaviour, in various regional EU scenarios, and propose measures to mitigate the most critical gaps/stressors/threats. It should be based on a comprehensive mapping of our current understanding, in particular including recent research. The research activities should provide as far as possible model systems for sustainable apiculture in several representative EU settings of environment and beekeeping and a better understanding of the contribution of bees to sustainable pollination for major dependent crops in the EU (with or without managed honeybees). Projects should fall under the concept of the 'multi-actor approach'[29]. The projects

[27] http://www.efsa.europa.eu/

[28] https://eurl-milk.anses.fr/en/minisite/abeilles/eurl-honeybee-health

[29] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

should ensure appropriate dissemination to the breeding and professional sectors and other relevant stakeholders to facilitate uptake of results.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Review of the most critical gaps/stressors/threats in achieving bee health, sustainable pollination and sustainable beekeeping in different European. Contribution to the development of mitigation measures for the most critical gaps/stressors/threats. Provision of model systems for sustainable apiculture.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-17-2017: Innovations in plant protection

Specific Challenge: Pesticides are a crucial input in agriculture used to combat plant pests and diseases and secure quality and yield in plant production. At the same time, concerns are mounting over the effects of plant protection products on the environment, non-target organisms and human health. Consumers and the food chain alike are increasingly demanding food products that are residue-low or residue-free and produced in more sustainable ways. This applies particularly to fruit and vegetables, which are often consumed fresh without prior processing.

Member States and EU policies seek to reduce reliance on pesticides for crop protection through the design and implementation of more integrated approaches and restrictions on the use of several active substances currently used in pesticides. The escalation of evolved resistance is putting further strains on the availability and use of plant protection products. Significant effort is required to develop alternatives to current disease and pest control products. Similarly, a better understand of genetic, evolutionary and agronomic drivers of the evolution of pesticide resistance is required to develop more durable and environmentally sustainable plant protection strategies.

Scope: Activities will foster the development and testing of new products, tools and strategies for integrated pest and disease management to reduce the use of pesticides in the fruit and vegetable sectors (including herbs and medical plants). Work will improve current cultural practices so as to increase the resilience of fruit and vegetable crops against biotic stresses. It will tackle the development and testing of novel, more sustainable products and tools for their application, taking due account of the potential of nature-based compounds. Activities will enhance knowledge of the mechanisms whereby plants develop resistance and help understand how evolution and spread of resistance lead to control failures across farming

systems. Projects should fall under the concept of the 'multi-actor approach'[30] bringing together contributions from a wide range of stakeholders including research, farming, advisory services, industry as well as consumers and civil society. They should also seek contributions from social and economic sciences to cover the broader economic, social, behavioural and environmental issues associated with the adoption of novel pest management strategies. Gender issues will be addressed as appropriate[31]

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

Expected Impact: Proposed activities will broaden the armoury of tools available for integrated pest management in the fruit and vegetable sectors. They will help to:

- reduce reliance on plant production products;
- introduce novel products with increased specificity and improved environmental performance (e.g. reduced effects on non-target organisms and natural resources);
- decrease residue concentrations in fruit and vegetables;
- increase food safety and contribute to human health (consumers and applicators);
- support innovations in the field of plant protection.

In the longer-term results will contribute to reducing pesticide residues in terrestrial and aquatic ecosystems, drinking water and the food chain. They will also strengthen the European fruit and vegetable sectors by supporting productivity and product quality. This is expected to increase consumer trust and fruit and vegetable consumption. Results will support product innovation and the competitiveness of European industries including SMEs.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-18-2016: Framework Partnership Agreement supporting Joint Actions towards Public-Public Partnerships in the Bioeconomy

Specific Challenge: Agriculture, forestry, the agri-food sector and the non-food value chains are integral parts of the economy and society in Europe. They are subject to multiple external pressures such as rising demand for food, feed, fuel and fibres, globalisation, environmental changes and public health considerations. They are also constrained by physical limits such as

[30] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

[31] See definition of the 'gender dimension of research' in the introduction of this Work Programme part.

the availability of land and water. Global population is expected to increase. This is likely to be accompanied by an increased rate of environmental change, rising demand for animal food products and competition for natural resources. This means that agriculture, forestry and their value chains will need to become more efficient, and sustainable.

Over 90% of the research that takes place in Europe is funded by national programmes. It is therefore vital that there is continued support for the transnational coordination of national and regional research programmes under Horizon 2020 to build on the significant progress already made. This is central to maximising the leverage, synergies, efficiency gains and structural improvements needed to underpin the European Research Area and continue the positive developments in the Bioeconomy sector, while at the same time streamlining the joint activities. This means Horizon 2020 needs fit-for-purpose, streamlined coordination mechanisms and appropriate financial support.

Scope: The purpose of this call is to create a single[32] Framework Partnership Agreement (FPA) to strengthen and simplify cooperation between the European Commission and Member States' programme managers and programme owners under Societal Challenge 2 (Bioeconomy). This will allow Member States to develop and implement a long-term action plan based on a set of ERA-NET Cofund actions. Proposals under this call should cover a wide range of countries and different programme managers and owners.

Only one proposal will be funded under this topic.

At a later date, the Commission will launch an invitation to submit proposals[33] for Specific Grant Agreements under this Framework Partnership Agreement.

Expected Impact: The simplification of ERA-NET Cofund actions is an important milestone in boosting collaboration with and between Member States. In relation to Societal Challenge 2 (Bioeconomy), it is expected to:

- establish long-term and more strategic collaboration between programme managers and owners in Member States in areas of common interest in relation to Societal Challenge 2;
- increase the involvement of programme managers and owners in jointly addressing sustainability challenges, including through ERA-NET Cofund actions, thereby improving cooperation at European and global levels between Joint Programming Initiatives and ERA-NETs under a common strategic framework.

The Framework Partnership Agreement will in this instance last for 5 years in order to cover the remaining duration of Horizon 2020. This is justified by the fact that it is planned that the

[32] This is in line with the objective of transnational coordination of national/regional programmes, with a maximum number of countries participating in the resulting joint actions.

[33] The resulting ERA-NET Cofund actions are actions with specific characteristics that require a particular type of body (programme managers and programme owners).

joint actions will continue until the end of Horizon 2020. Proposals submitted under this call should include all organisations that intend to participate in future ERA-NET Cofund actions.

Type of Action: Framework Partnership Agreement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-19-2016: ERA-NET Cofund: Public-Public Partnerships in the bioeconomy

Specific Challenge: Agriculture and the agri-food sector are integral parts of the economy and society in Europe. They are subject to multiple external pressures, such as rising demand for food, feed, fuel and fibres, globalisation, environmental changes and public health considerations. They are also constrained by physical limits such as the availability of land and water. Demand for animal food products and competition for natural resources are expected to increase. This implies that agriculture and agri-food sector will need to become more efficient and sustainable.

Scope: Proposals should address one or more of the following issues (A) to (C) and should clearly indicate to which one they refer.

A. [2016] Organic farming and food production

Scope: In recent years the organic market in the EU, driven by steadily increasing demand, has developed significantly (EUR 19.7 billion with a 9% growth rate in 2011). While demand for organic products tends to exceed production, during the last decade, the number of organic producers and the surface area under organic production have grown rapidly. Every year, 500,000 hectares of agricultural land in the EU are converted to organic farming. In the period 2000-2012, the total organic area increased by 6.7% a year on average, reaching an estimated 9.6 million hectares, or 5.4% of the EU's total utilised agricultural area. Organic aquaculture is also growing fast following the introduction of EU rules in 2009. The overall aim is to improve jobs and growth in the organic sector by improving organic farming and food chains and, consolidating funding for transnational research and innovation activities. This ERA-NET Cofund is a follow-up to CORE Organic I (FP6) and CORE Organic 2 (FP7). At a policy development level, this is in line with the Commission Communication on the action plan for organic production in the European Union, the existing regulations in the organic sector and the Commission proposal for a new regulation on organic production (COM(2014)180) as it will increase the innovative capacity of the sector if certain exemptions are phased out.

Expected Impact: More sustainable agricultural production systems, food processing and food value chains through the further development of organic products and fulfilment of the rising demand for organic products, support for the Common Agricultural Policy and organic farming regulations and other relevant policy areas, e.g. health, trade and jobs. More specifically, projects developed under the proposed Cofund action will: i) improve the

production potential under organic regulations; ii) improve the sustainability of agricultural production; iii) improve animal welfare and resource efficiency; and iv) link up to innovation needs of European Innovation Partnership operational groups.

B. [2016] Sustainable food production and consumption

Scope: Achieving a sustainable food supply that incorporates new food processing technologies and that is supported by consumer acceptance, is an innovation priority for the food industry and civil society organisations. A SUSFOOD ("SUStainable FOOD production and consumption") ERA-NET Cofund will seek to increase collaboration and coordination on national research into the sustainability of food production and consumption, with the main focus on the food supply chain beyond the farm gate. The 7th Framework Programme (FP7) experience has shown that there is still potential to organize and implement calls for proposals on this issue with excellent chances of a good rate of return on the money invested. The Commission's national consultations, held in 16 European countries, show there is a common desire to continue efforts to keep food sustainability high on the research and innovation agenda. There is also a willingness to provide the necessary funding. Proposals should take into consideration (and can build on previous) EU-funded activities in this field.

Expected Impact: Innovation in food processing technologies; redesign of input, waste and side flow strategies to increase resource efficiency and provide added value in food products and processing, manufacture etc.; interdisciplinary research approach to innovation in food products and use of new raw materials for food products; harmonisation of the methods and metrics for the integrated assessment of the sustainability of food products and food patterns; link between stakeholders and food systems; greater understanding of consumer behaviour and food choices; integration of information systems for personalized, sustainable choices.

C. [2016] A knowledge platform for the intestinal microbiome

Scope: For many years it has been known that the composition and function of the intestinal microbiome affect the conversion and availability of some dietary components. There is a growing body of evidence on complex host-diet-microbiota interactions, highlighting the need to consider these interconnections as a triad that will define the success of dietary interventions and European policies. Importantly, there is mounting evidence to suggest that the intestinal microbiome affects both gut and systemic health. Specifically, diet-related variations in the gut microbiota have been linked to a variety of non-communicable chronic diseases, including obesity, type 2 diabetes, cancer, and auto-immune, brain and cardiovascular diseases.

Gut microbiota analysis and modulation is a new and rapidly developing research area. However, the causal relationship between diet, gut microbiota and human health is still poorly understood. These studies may provide new strategies for health promotion and disease prevention, development of healthy ingredients and foods bearing health claims as well as probiotics and prebiotics based on functional analysis of genomic and metagenomic data. There is a need for joint research activities relating to the intestinal microbiome, particularly

to share and integrate existing data, investigate the 'cause and effect' relationship between changes in microbiota composition and disease (including the role of human genetics), to identify the main dietary components that lead to functional changes in gut microbial composition, as well as to standardise methods and study designs to analyse and understand the human diet-gut microbiota interaction.

Expected Impact: This ERA-NET Cofund should generate new knowledge to support health maintenance, prevention strategies and/or new treatments. It should shed light on the human diet-gut microbiota interaction in relation to health and disease. It should also create a knowledge base for intervention studies aimed at promoting health and/or preventing the onset/development of non-communicable chronic disease through diet-dependent modulation of the intestinal microbiota.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million for each of (A) to (C) respectively would allow this topic to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Proposals should pool the necessary financial resources from the participating national (or regional) research programmes to implement a joint call for proposals resulting in grants to third parties with EU co-funding in this area. Proposers are encouraged to include other joint activities including additional joint calls without EU co-funding.

The thematic focus of these calls should correspond to the funds available, to ensure the call has a reasonable success rate. ERA-NETs should seek synergies with other relevant European and international research and innovation initiatives as regards sustainability and resilience of agriculture and food systems, in particular the FACCE (Agriculture, Food Security and Climate Change) and HDHL (A Healthy Diet for a Healthy Life) Joint Programming Initiatives. In line with the EU strategy for international cooperation on research and innovation, proposals should include international cooperation, and ERA-NETs should be open to the national programmes on third countries.

The proposals should also aim to implement additional joint activities (e.g. joint calls without EU co-funding).

Expected Impact:

- Improve coordination and reduce the overlap between national and EU funding in relevant fields of research;
- achieve a critical mass and ensure better use of limited resources in fields of mutual interest;
- share good practice on implementing research programmes;
- promote transnational collaboration and new knowledge generation and innovation;

- involve small and medium-sized business in transnational projects, if appropriate, to enhance innovation.
- map on-going research activities (where appropriate);
- establish a network of research activities carried out at national and regional level, including a mutual opening of national and regional research programmes (where appropriate).

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-20-2017: Towards a science-based regionalisation of the Common Fisheries Policy

Specific Challenge: The new Common Fisheries Policy (CFP) envisages a regionalised ecosystem-based approach relying on detailed measures proposed jointly by Member States under the umbrella of common principles and benchmarks set up in EU legislation. This will require choosing appropriate management units (fisheries, fishing gears, sea basins, fish stocks, stock assemblages, target fleets, geographical units, etc.) and combining in an innovative manner management instruments and new governance mechanisms adapted to specific regional needs. Implementing this new approach to fisheries management is already a serious challenge for fisheries in European Atlantic waters. For Mediterranean fisheries, the challenge of regionalisation is exacerbated by the legal situation (narrow bands of EU waters with larger areas outside national jurisdictions), generally poor state of fish stocks (or lack of knowledge thereof), narrow continental shelves and the high number of small fishing vessels.

Scope: Future approaches to fisheries management must take much closer account of regional fisheries practices, the specificities of regional ecosystems, and of the diverse "multi-actor"[34] interests as a basis for implementing an ecosystem-based approach, without disregarding the likely interconnections with large marine ecosystems. On a regional basis, projects should identify potential biological, technical, economic, administrative, social and societal barriers to achieving the CFP's fisheries management objectives, through regionalisation instituted by Article 18 of the new Regulation (EU) No 1380/2013. Projects should identify potential social and economic imbalances arising from changes allowing the fishing industry and fisheries managers to adapt to new knowledge and new governance arrangements. Highlighting strengths and weaknesses of the emerging regionalisation process and structures, research projects should also develop and propose ways of resolving or circumventing barriers that have been identified and the means to evaluate how effective these ways are, especially in the Mediterranean Sea. Projects should consider work being carried-out in regional seas conventions (RSCs) and explore how RSCs and regional fisheries management structures can work better together.

[34] See definition of the 'multi-actor approach' in the introduction to this Work Programme part (see text box).

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals addressing the Mediterranean should contribute to implement the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)[35].

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To improve regional implementation of the CFP and make progress on meeting the objective of maximum sustainable yield, proposals should:

- Improve the biological, economic, technical, social and environmental knowledge base for regionalised management decisions taking into account the relevant specific issues when dealing with Mediterranean fisheries.
- Share the project's results with relevant stakeholders and promote uptake by relevant end-users to improve social and societal acceptance of fisheries management measures.
- Ensure that conservation measures are agreed at the regional level.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-21-2016/2017: Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species

Specific Challenge: More efficient fisheries management, based on science, is needed to support the continued need to manage European fisheries, the global rise in seafood demand and the need to maximise fish production sustainably. Our understanding of the biology and ecology of several fish and other seafood species is far from complete for stocks fished in European seas and in particular for multi-species fisheries. This also applies in some areas

[35] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio-economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

outside EU waters where EU fleets fish. Relevant stocks include species in international waters or in the waters of third countries with which the EU has signed sustainable fisheries partnership agreements. For species fished outside EU waters, the challenge often extends beyond gathering knowledge of biological characteristics to include research on management tools and appropriate stock assessment models.

Scope: Proposals should focus on an identified number of fisheries that are important for the fishing fleets of multiple EU countries and should respond to the priorities of Regional Fisheries Management Organisations (RFMOs) and of the Common Fisheries Policy (CFP). The proposals should review existing knowledge and perform multidisciplinary research to help close important knowledge gaps that have a significant impact on the management of key target and by-catch species and that currently limit the advice that relevant bodies can give. Research results should be able to be applied immediately to provide a more solid knowledge base and advice on fisheries management.

Proposals should cover one of the following geographical scopes:

1 [2016] Knowledge base and management tools for resilient and resource-efficient fisheries in waters of third countries with which the EU has signed sustainable fisheries partnership agreements and in international waters covered by regional fisheries management organisations other than the North-East Atlantic Fisheries Commission and the General Fisheries Commission for the Mediterranean.

2 [2017] Strengthening the knowledge base for resilient and resource-efficient fisheries in EU waters and in international waters covered by the North-East Atlantic Fisheries Commission and the General Fisheries Commission for the Mediterranean.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To improve fisheries management under the Common Fisheries Policy, including outside of EU waters, proposals should:

- Increase the knowledge base, share new findings, provide new tools and promote their uptake by end-users to more efficiently manage fish stocks of interest to the EU, both inside and outside EU waters.
- Increase the long-term profitability of the EU fleet and increase the number of jobs in the fishing sector.
- Improve market supply and food security in Europe through a significant, predictable and sustainable provision of seafood from all areas in which EU vessels operate.

- Contribute to adjusting fishing exploitation to levels that ensure the maximum sustainable yield.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-22-2017: Smart fisheries technologies for an efficient, compliant and environmentally friendly fishing sector

Specific Challenge: Resource efficiency in the fishing sector and its improvement has many dimensions, including in particular extraction, scientific assessment of fish stocks and monitoring for scientific or surveillance purposes. While promising new technologies are being developed in several fields (e.g. information technology, new detection, monitoring and surveillance techniques, new materials, aerospace, etc.) the pace of their introduction in the fishing sector is far from optimal. It is generally assumed that fishing, control and data collection are under-performing, may lack accuracy, and are unnecessarily expensive. The extraction sector could largely benefit by improving cost-efficiency and compliance, and limiting its environmental impact by taking advantage of technological progress. Knowledge, monitoring, surveillance and assessment of resources could similarly be improved by using modern technologies, including for instance unmanned vehicles or drone-like devices. The challenge lies in identifying the possibilities and ways to improve the uptake of high-level technology throughout the fisheries value chain, and the possibilities of improving resource efficiency for fishing operations and the activities surrounding them (e.g. monitoring, data, knowledge).

Scope: The proposals should explore opportunities to increase the use of innovative technologies in all fisheries-related activities, including the extractive sector, the collection of data and information and the monitoring of compliance with the rules. Proposals should assess the innovative potential and applicability of new technologies in the fishing sector with the aim of avoiding unnecessary fish mortality, damage to other marine resources and ecosystems; improving energy efficiency; and increasing overall economic efficiency and social acceptability. The expected results should be directly applicable to important fisheries in all European seas. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

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

Expected Impact: To improve resource efficiency in the fishing sector, proposals should:

- Identify existing technologies and their potential for use in the fishing sector, bring these to a readiness level that means they can be used by the fishing sector across the EU and promote their uptake by end users.
- Improve the performance of fishing vessels in terms of resource efficiency, including effective use of resources for data collection and fish stock assessment.
- Reduce the cost of marine monitoring.
- Improve economic efficiency and profitability, avoiding increasing unnecessary fishing pressures and undermining sustainable resource use.
- Involve the fishing sector in collecting evidence for implementing marine policies.
- Improve compliance and reduce illegal, unreported and unregulated fisheries.
- Support the implementation of the EU Common Fisheries Policy and the Marine Strategy Framework Directive.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-23-2016: Improving the technical performance of the Mediterranean aquaculture

Specific Challenge: Mediterranean aquaculture contributes to food security, employment and trade in the region. Its competitiveness can be increased by improving its technical performance together with a shift from production-oriented growth to market-oriented and consumer responsive approach. To ensure sustainable growth of the Mediterranean aquaculture industry, farms must operate not only in ideal economic and environmental conditions but also in a socially and culturally responsible manner.

Scope: Proposals should integrate and improve the technical viability of the current production systems for Mediterranean aquaculture, including biological and operational aspects, using new and cost-effective innovative technologies and practices to ensure the sector's sustainability and growth. In particular, proposals should substantially improve current key performance indicators (KPI) used for the principal Mediterranean species: growth rates, mortality and feed efficiency. They should also develop tools for marker-assisted selection and look at Mediterranean aquaculture market development, to develop strategic marketing plans for the promotion, product development and commercialisation of Mediterranean aquaculture production in new and existing markets. Where appropriate, proposals should make use of national and international research infrastructure programmes

and services such as the Copernicus Marine Environment Monitoring Service, to better support a regional management approach. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals should contribute to implementing the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area [36].

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To improve the competitiveness of EU Mediterranean aquaculture production, proposals will have to:

- Consolidate Mediterranean aquaculture production for key species towards a commercial scale through sustainable fish farming and valuable seafood production.
- Draw up solid marketing plans for local and regional production which will boost jobs and trade in the region.
- Develop a code of conduct and good practices and harmonised standards across the Mediterranean to promote responsible aquaculture practices in the region.
- Improve the image of aquaculture production systems and products supported by market-oriented production and a consumer responsive approach.
- Increase consumer awareness of high quality and safe products from Mediterranean aquaculture that certify freshness, traceability, animal welfare[37] and the sustainability of the systems.
- Support the implementation of the EU Common Fisheries Policy (CFP).

[36] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

[37] In line with the Council Directive 98/58/EC that lays down minimum standards for the protection of animals bred or kept for farming purposes, including fish and also with international organisations such as the Council of Europe and the World Organisation for Animal Health (OIE) which have also issued recommendations and guidelines concerning fish welfare.

- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-24-2016: Reinforcing international cooperation on sustainable aquaculture production with countries from South-East Asia[38]

Specific Challenge: With 90% of all world aquaculture production based in Asia, and with Europe importing close to 70% of its seafood (in particular from South-East Asia[39]), both regions have an interest in working together to develop sustainable solutions, since production has to nearly double in the next decade to meet the increasing seafood market demand. Sustainable aquaculture production is a major challenge for global seafood security and safety. In order to provide greater benefits for the EU and South-East Asian countries and to make future aquaculture sustainable, more work is needed on technology innovation, resource efficiency, reduced environmental impact, harmonised standards and marketing.

Scope: Proposals should draw up a plan to launch a multi-stakeholder platform to reinforce international cooperation between Europe and South-East Asian countries on food security and safety with specific emphasis on sustainable aquaculture production and contributing to European competitiveness. The multi-stakeholder platform should support structuring new networks and partnerships between industrial players aiming to enhance business opportunities and the up-take of innovations in promising aquaculture domains. Those participating in the platform should also contribute to the development of common standards for appropriate environmental planning/zoning, increased food safety, and improved farming governance. Additionally, there should be particular focus on reinforcing capacity building by aligning European training programmes, including through industrial apprenticeship opportunities and networking with South-East Asian partners.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

[38] This activity directly aimed at supporting the promotion of coherent and effective cooperation with third countries is excluded from the delegation to REA and will be implemented by the Commission services.

[39] South-East Asian countries: Indonesia, East Malaysia, Singapore, Philippines, East Timor, Brunei, Christmas Island, Cambodia, Laos, Myanmar (Burma), Thailand, West Malaysia, and Vietnam.

Expected Impact: To contribute to the creation of a long-term partnership between Europe and South-East Asian countries on sustainable aquaculture and to reinforce the mutual benefits of science diplomacy between the regions, proposals will have to:

- Contribute to common standard setting and legislation, particularly around ecosystem-based farming.
- Facilitate the creation of business opportunities for industrial partnerships between Europe and South-East Asian countries.
- Reduce risks to animal and human health and thus increase EU consumer's confidence in seafood products.
- Consolidate EU-South-East Asian education and training networks.
- Contribute to reinforce targeted international cooperation on sustainable aquaculture production between EU and South East-Asian countries, supporting the EU-ASEAN Partnership[40] and the underlying EU-ASEAN High-level Policy Dialogue on science, technology and innovation.
- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-25-2016: Support Action to a common agricultural and wider bioeconomy research agenda[41]

Specific Challenge: To consolidate a common agricultural and wider bioeconomy research agenda that enhances cooperation, coordination, and information exchange between the Member States.

Scope: Improve the alignment and interoperability of national research programmes in the Societal Challenge 2 domains; broaden the participation of the different strategic and collaborative working groups, ERA-NETs, and JPIs; stimulate and maintain the interest of relevant countries not yet fully involved; improve the overall organisation communication and

[40] In 2007, the Nuremberg Declaration on an Enhanced EU-ASEAN Partnership was signed at the 16th Ministerial Meeting, in Nuremberg. In 2012, Foreign Ministers of ASEAN and the EU adopted the Bandar Seri Begawan Plan of Action 2013-2017, defining ASEAN-EU cooperation in the next five years.

[41] This activity directly aimed at supporting public-public partnerships with Member States and associated countries, technology platforms with industrial partners and earth observation networks is excluded from the delegation to REA and will be implemented by the Commission services.

dissemination activities underpinning a common agricultural and wider bioeconomy research agenda.

Submission of a single proposal is highly encouraged. In terms of geographical coverage, the consortium should be representative of the EU Member States and Associated Countries. Entities in EU Member States and Associated Countries not covered by the consortium should be identified and the reasons for not participating in the Consortium explained in the proposal. Representatives of or experts nominated by legal entities in charge of national research and innovation programmes and policies in the Societal Challenge 2 domains from these countries are nevertheless invited and encouraged to participate in the project activities (e.g. workshops), and the costs incurred by the consortium for such participation (e.g. travel costs) may be included in the estimated budget and be eligible for funding by the Commission.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: The research agenda should support the development of the bioeconomy in the European Research Area, based on a comprehensive analysis of EU wide national and regional financial and human bioeconomy capacities, including the barriers to greater alignment and interoperability across borders for the benefit of building up:

- A detailed and robust picture of the EU strengths and weaknesses in the common agricultural and wider bioeconomy research and innovation fields;
- identification of potential measures to support the development of the bioeconomy in the European Research Area;
- a more efficient European Innovation Partnership (EIP) on Agricultural Productivity and Sustainability and Agricultural/Bioeconomy Knowledge and Innovation Systems.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

ENVIRONMENT-SMART AND CLIMATE-SMART PRIMARY PRODUCTION

Proposals are invited against the following topic(s):

SFS-26-2016: Legumes - transition paths to sustainable legume-based farming systems and agri-feed and food chains

Specific Challenge: Thanks to their nitrogen-fixing properties, leguminous plants contribute to soil fertility and have a positive impact on the environment. Additionally, legumes are a critical source of plant-based proteins and amino acids for people around the globe, as well as for livestock. In both areas, fertilisers and protein crops, the EU has developed strong dependencies. On one hand, nitrogen fertiliser consumption in the EU27 is about 10 million tonnes per year with an import share of 20-26% over the past four years. The production of nitrogen fertilisers is highly dependent on natural gas and the EU imported 62% of its overall gas energy needs in 2006-2010. On the other hand, 70% of protein-rich raw materials consumed in the EU are imported (42 million tonnes in 2009). Compared with other major agricultural regions in the world, the EU dedicates a relatively small area to legume crops and this has even decreased in recent decades. With regard to the potential ecosystem services delivered by legumes, there has been an increasing demand to strengthen the role of legumes in farming systems and agri-food/feed chains to meet agronomic, environmental and economic objectives.

Scope: Activities will be aimed at developing sustainable legume-based farming systems and agri-feed and food chains in the EU. Projects will use case studies based on representative networks of farms which integrate legumes in their cropping systems and grasslands to explore the potential of legume production and the development of value chains for food and feed, taking into account complementarities between or within regions. Proposals will cover the diversity of available legume species and pedo-climatic conditions across Europe. The impacts of the potential development of legumes on other crops and on the delivery of eco-system services at regional, EU and global levels will be assessed. Proposals will analyse path dependency and lock-ins constraining the development of legumes in the EU in relation to the various actors and issues involved (e.g. farms, cooperatives, the feed industry, the food chain, supply chains, institutions, policies and trade agreements). Projects are expected to cover both conventional and organic sectors. They will develop transition paths that aim to lift identified constraints on sustainable legume-based agri-feed and food chains. Activities will involve transdisciplinary research, including input from social sciences and the humanities, to engage actors in developing the production and use of legumes, including market aspects. Proposals should fall under the concept of the 'multi-actor approach'[42] and ensure adequate involvement of the farming sector.

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

Expected Impact:

[42] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- development of sustainable legume-based cropping and grassland systems and agri-food and feed chains;
- increased the competitiveness of legume crops from farm to agri-food and feed chains;
- reduced environmental impacts of agricultural activities (e.g. greenhouse gas emissions and water pollution);
- integrated scientific support for relevant EU policies (Common Agricultural Policy, Water Framework Directive, climate change objectives); and
- strengthening of transdisciplinary research and long-lasting implementation of the results through the implementation of the multi-actor approach.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-27-2017: Permanent grassland – farming systems and policies

Specific Challenge: Permanent grasslands are associated with high biodiversity and the delivery of a wide range of ecosystem services (e.g. carbon sequestration, water quality, flood and erosion control). Permanent grassland is closely linked to the competitiveness of ruminant-based farming systems, but its maintenance is under threat, especially in areas where intensified farming systems or practices are feasible, but also in remote and high-mountain areas where it may be abandoned. Whether natural, semi-natural or agriculturally improved, long-term grasslands provide more ecosystem goods and services than short-term grasslands. The continuity and permanence of grasslands is key to ensuring the conservation of biodiversity and the provision of ecosystem services. There is an urgent need to recognise and add value to the multiple ecological functions of grasslands. In turn, this requires the generation of a wide range of data to characterise and benchmark sustainable farming systems based on permanent grassland, taking into consideration the various socio-economic and pedo-climatic conditions in Europe.

Scope: Proposals should develop integrated approaches for permanent grassland management which are cost-effective, environmentally sound and easily manageable. Synergies and trade-offs between productivity, biodiversity and continuity of the delivery of ecosystem services will be analysed in different contexts of intensification. Projects will develop farm-level decision support tools for the management of permanent grassland so as to enhance biomass production (for ruminant and/or innovative uses and markets) and the delivery of ecosystem services to society. Aspects of livestock health and welfare shall be given due consideration.

Activities will include the collection of relevant data to monitor, benchmark and analyse the performance of farming systems in terms of productivity, carbon sequestration, socio-economics, biodiversity and the delivery of ecosystem services. Proposals will develop and

stratify farm networks reflecting relevant European pedo-climatic and socio-economic conditions and involve experimental stations, experimental farms and commercial farms to produce references and identify innovative approaches. Proposals could possibly use instrumented farm platforms to compare different forms of grassland management in order to determine the value of permanent grasslands as providers of food and other ecosystem services. Projects are expected to cover both conventional and organic sectors.

On the basis of the farm network output, work will help in the assessment of the effect of various grassland policies on biodiversity and delivery of ecosystem services. Taking into consideration the importance and the diversity of grasslands in Europe, this policy analysis could also be extended to relevant third countries. Innovative approaches to creating, maintaining and restoring permanent grassland should be proposed at the appropriate territorial scale. Proposals should develop agri-environmental indicators (including soil carbon content) on grasslands and grassland-based systems as a basis for better recognition of the ecosystem goods and services that permanent grasslands can provide.

Proposals will use transdisciplinary research methods and should fall under the concept of the 'multi-actor approach'[43], involving the farming sector with a view to generating cross-fertilisation and co-ownership.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. The duration of the project should take into consideration the need to coordinate and implement farm networks.

Expected Impact:

- benchmarking of grassland outputs based on local and regional site conditions across Europe;
- provision of farm-level tools for the management of permanent grasslands taking into account environmental, economic and social dimensions;
- enhanced cooperation and knowledge exchange;
- improved policy instruments for the conservation of biodiversity and delivery of identified ecosystem services provided by permanent grasslands and appropriate incentives to reduce conflict between productivity objectives in primary production, biodiversity conservation and the delivery of such services;
- integrated scientific support for relevant EU policies (e.g. CAP, WFD, CC objectives);

[43] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- strengthening of transdisciplinary research and long-lasting implementation of the results obtained through the implementation of the multi-actor approach.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-28-2017: Functional biodiversity – productivity gains through functional biodiversity: effective interplay of crop pollinators and pest predators

Specific Challenge: Biodiversity and various ecosystems serve agricultural production in many different ways, not all of which are well known. The smart use of these services can make agriculture more sustainable and reduce chemical inputs. The development of agricultural systems that maximise such services requires a "knowledge leap" based on advances in various areas of science, from new farming practices to modern technologies. The sustained delivery of these services by semi-natural habitats depends heavily on their botanical composition and spatial configuration. Beyond the field and farm level, cooperation between farmers and other actors is required at landscape level. There is a real need for a wide range of data to characterise and benchmark sustainable farming systems under various socio-economic and pedo-climatic conditions in Europe, and to find effective ways of encouraging farmers to adopt them.

Scope: Proposals will explore the functional role of biodiversity in the delivery of ecosystem services, in particular the spatial and temporal interactions between plants/animals as pollinators and natural enemies of pests. They will help to improve understanding of the factors and mechanisms that govern the delivery of such services, including agricultural management and landscape characteristics. Proposals will study and test approaches to enhancing the performance of the services by the targeted promotion of pollinators and natural enemies of pests through habitat provision and management. Cost effectiveness of these services will be compared with that of other agricultural practices (e.g. use of agrochemicals), including an evaluation of production stability and risk management for farmers. Work will examine synergies and trade-offs between pollination, the natural control of pests and other ecosystem services for agricultural production and environmental objectives. Prototypes of sustainable agro-ecology systems, including organic systems, agro-forestry and permaculture, will be developed from farm to landscape/territorial levels. Work will cover pastoral, arable and horticultural systems and potential forms of interaction and cooperation between these sectors at landscape level.

Proposals should establish a farm-level observatory and knowledge-exchange network on biological control and pollinator services linking with the European Innovation Partnership with a focus on innovative system solutions for short- and long-term needs. Activities will target farming systems and clearly cover all dimensions of sustainability (environmental, economic and social). Activities will include the collection of the requisite data to monitor,

benchmark and analyse the performance of these farming systems in various respects. Proposals will develop and stratify farm networks reflecting relevant European pedo-climatic and socio-economic conditions and involve experimental stations, experimental farms and commercial farms to produce references and identify innovative approaches.

Proposals will use transdisciplinary research methods and should fall under the concept of the 'multi-actor approach'[44], involving the farming sector with a view to generating cross-fertilisation and co-ownership.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. The duration of the projects should take into consideration the need to coordinate and implement of farm networks.

Expected Impact:

- effective solutions for the delivery of biological control and pollination services;
- improved overall sustainability and innovation capacity of the farming systems;
- reduction of the environmental impact: improvement of ground- and surface-water quality, conservation of biodiversity and wildlife;
- strengthened transdisciplinary research and long-lasting implementation of the results obtained through the implementation of the multi-actor approach; and
- enhanced cooperation and knowledge exchange.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-29-2017: Socio-eco-economics – socio-economics in ecological approaches

Specific Challenge: Ecological or ecosystem-based approaches have emerged as an alternative to farming based on chemical inputs. Farming systems implementing such approaches (eco-functional intensification) are often defined as "low-input", but they generally require more knowledge and labour per hectare than those based on chemical inputs. To deliver agricultural products for the market and public goods for the society, there is a need for a better understanding of the socio-economic and policy factors that hinder or enhance the development of such systems by identifying the trends and drivers encouraging the involvement of farmers, actors in the value chain, consumers, educators and policy makers.

[44] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Scope: Based on case studies and representative farm typologies, proposals will involve drawing up an economic, environmental and social comparison of identified production systems implementing ecological approaches and conventional farms in the same sectors of production. A wide range of systems will be considered, e.g. organic and other low chemical input systems, systems implementing biological control, and diversified *versus* specialised systems. Various sectors will be covered, e.g. arable crops, livestock, vegetables and fruits, vineyards, agro-forestry, mixed farming integrating crop and livestock systems and/or multipurpose breeds. Different strategies will be compared, e.g. pursuing economies of scale in the conventional systems *versus* the economies of scope proposed for some ecological approaches. Economic performance and delivery of public goods will be evaluated on the basis of different indicators at farm, farm-group and territorial levels. Specific emphasis will be placed on analysis of the labour productivity in terms of the amount and value of private and public goods produced. Incomes in the different systems will be analysed on the basis of market and public payments. Issues related to gender differences [45] and demographic characteristics and patterns in farming communities should be investigated if relevant.

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

Expected Impact:

- improved integrated capacity and method to assess the sustainability of different agro-ecological approaches;
- increases in productivity, delivery of public goods and job creation through improved agro-ecological approaches and market and policy incentives; and
- strengthened transdisciplinary research and integrated scientific support for relevant EU policies and priorities (Common Agricultural Policy, Water Framework Directive, climate change objectives, jobs, etc.).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-30-2017: Closing loops at farm and regional levels to mitigate GHG emissions and environmental contamination - focus on carbon, nitrogen and phosphorus cycling in agro-ecosystems

Specific Challenge: Carbon, nitrogen and phosphorus losses from land and increasing concentrations in receiving waters or in the form of greenhouse gases (GHG) in the

[45] See definition of the 'gender dimension of research' in the introduction to this Work Programme part.

atmosphere are environmental issues of major concern. Agriculture contributes significantly (directly and indirectly) to these emissions, e.g. through land use, land use change, ploughing and soil carbon losses, animal production and fertiliser use. Mitigation solutions need to be based on a thorough understanding of the cycling of carbon (C) and nutrients (nitrogen (N) and phosphorus[46] (P)) at various levels to reduce emissions and environmental contaminations and develop possibilities for carbon sequestration. An integrated approach is needed to identify factors and mechanisms that govern these cycles, ranging from agricultural management to consumption patterns.

Scope: Proposals will provide a comprehensive analysis of C, N and P flows and cycling on farms and within landscapes, taking into account different types of production systems and the impacts of land-use intensification. Work shall consider trade-offs and synergies between impacts (on climate, water quality, air, soil) of C, N and P cycles and with farm productivity and the quality of agricultural products. Proposals will seek to generate efficiencies and close loops, including at the interfaces between plants (e.g. N-fixing trees and crops, forest/arable land), between plants and animal production (e.g. fertiliser/manure or protein/feed, grasslands/ruminants, etc.) and within the animal sector (e.g. feeding and stock replacement strategies, cross and mixed breeds, etc.). They will study and test innovative approaches to closing C, N and P loops. Prototypes of sustainable agro-ecology systems, including organic systems, will be developed at various scales from farm level to landscape/territorial level in order to reduce GHG emissions and nutrient intensity. Proposals will also tackle consumption patterns and establish how demand-side management (e.g. diets, waste reduction and waste management, consumer behaviour) can be paired with efforts to lower emissions and optimise C, N and P loops. This will include looking at international trade in relation to the EU supply of energy and proteins, land use changes and carbon sequestration in soils. International cooperation shall be envisaged as appropriate. Proposals should fall under the concept of the 'multi-actor approach'[47].

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

Expected Impact:

- effective solutions for C-, N- and P-efficient agro ecosystems;
- improved overall sustainability and innovation capacity of the farming systems;
- reduction of environmental impact: reduced GHG emissions, protected and enhanced soil carbon stocks, improved ground- and surface-water quality;

[46] Phosphate rock is on the list of critical raw materials defined in 2014 (COM(2014)297). Within Societal Challenge 5, dedicated topics SC5-13 to 17 deal with raw materials

[47] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- integrated scientific support for relevant EU policies (e.g. Common Agricultural Policy, Water Framework Directive, sustainable use of pesticides, climate change objectives); and

- strengthened transdisciplinary research for long-lasting implementation of results.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-31-2016: Farming for tomorrow - developing an enabling environment for resilient and sustainable agricultural systems

Specific Challenge: The European farming sector is facing constant economic, environmental and social challenges in rapidly changing economic and policy environments. It is increasingly affected by factors external to farming which make it more vulnerable to external shocks. As a consequence, it has undergone considerable changes in recent decades: farm size and investment have increased steadily to maintain farming income. In some sectors (e.g. livestock), production is becoming more concentrated in specialised regions, potentially increasing pressure on the environment. Risks in agriculture have increased as a result *inter alia* of the abolition of price policies, globalisation, more frequent extreme weather events in a changing and more variable climate, and pest and disease outbreaks/epidemic diseases. These and other factors have a strong bearing on the farm demographics of farmers and the attractiveness of the sector. Generation renewal in agriculture plays a crucial role in maintaining viable food production and contributing to the sustainability of the sector and rural areas generally. For example, a rapid decline of farming communities in many areas in Europe is expected to compromise the long-term provision of public goods. There is a need to analyse these issues thoroughly in order to understand long-term dynamics in the sector and develop an environment conducive to the delivery of private and public goods.

Scope: Activities should provide a thorough investigation of the main factors driving farm demographics along with their implications for the agricultural sector, rural development, the environment and the provision of public goods. Proposals should develop long-term projections and modelling and measure the impact and effectiveness of relevant policies. Work should identify further measures to facilitate entry to the sector. The impact of consumer preferences on the farming sector is also to be taken into account. Investigations will cover a wide range of sub-sectors (including commodities and value-added products). Investigations will also aim at understanding farmers' risk management strategies and behaviours as regards the adoption and use of risk-management tools, their behaviours in market-crisis situations, the conditions and availability of information necessary for the effective management of risks at farm level and the role of policy tools. Gender-related

aspects will be investigated as relevant[48]. Research will extend to strategies at meso/macro levels to cope with the risks associated with an increased occurrence of extreme weather events.

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

Expected Impact: The project results are expected to:

- improve the delivery of the policy framework to agricultural activity thus fostering its sustainability. Particular attention will be paid to the delivery of the EU's Common Agricultural Policy (CAP);
- provide farmers with better risk-management tools; and
- improve the resilience of the agricultural sector in coping with the risks it faces.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-32-2017: Promoting and supporting the eco-intensification of aquaculture production systems: inland (including fresh water), coastal zone, and offshore

Specific Challenge: Aquaculture is an attractive and important component of rural and coastal livelihoods providing employment and facilitating a sustainable economy by means of business development and diversification. The opportunities for growth of the aquaculture industry in the EU remain substantial given the potential for innovation with respect to culture techniques, technological advances, species and product diversification. European aquaculture production is expected to sustainably increase by continuously pursuing ways and means of improving production practices, to make them more efficient and cost-effective while improving resource use and environmental management. This sustainable eco-intensification of the European aquaculture industry has been identified as a major challenge ahead in order to meet global fish and seafood security needs for future generations.

Scope: Proposals should support aquaculture production and communities with cost-effective innovative solutions and technologies that ensure sustainable offshore, coastal and inland development and growth. They should look at strengthening integrated aquaculture activities (species and systems) in a sustainable way, by implementing new/emerging technologies and innovations in monitoring and management systems and focusing on sound economic reduction of operational costs related to innovative aquaculture production systems. The

[48] See definition of the 'gender dimension of research' in the introduction to this Work Programme part.

participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To contribute to the eco-intensification of European aquaculture, proposals should:

- Bring to the market new and cost effective commercial applications to assist aquaculture producers in their activity.
- Secure EU markets by increasing the offer of high quality fish and seafood products from a continuous supply of EU aquaculture products that meet EU consumers' demands and contributing to reducing the dependency of the EU on imports of fish and seafood products from international markets.
- Improve the sustainability of the European aquaculture industry by optimising production systems and profitability while ensuring optimal resource use and minimising environmental impact
- Consolidate eco-efficient aquaculture practices to ensure access to high-value niche markets while minimising the environmental impact of the activity.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

A COMPETITIVE FOOD INDUSTRY

Proposals are invited against the following topic(s):

SFS-33-2016: Understanding food value chain and network dynamics

Specific Challenge: Food chains play a key role in the EU economy and society: ensuring food and nutrition security, contributing to local and global economies, providing jobs and

having a significant impact on the environment. The proper functioning and sustainability of food chains depend on the viability of each link. Therefore there is a need to understand metrics and dynamics at each level, especially within and across the food value chains, and their capacity to foster the sustainability and resilience of the food system. Economic theories on the interaction of chain partners and the implications for private and social welfare have existed for some time, backed-up by case-studies (predominantly qualitative). However, the challenge remains of providing quantitative and model-based underpinning of economic behaviour in the food chain. The use of unfair contractual practices within the chain and its detrimental effect on the chain's economic sustainability need to be better understood so that we can identify and analyse such practices and quantify their impact. Information asymmetries can undermine proper price-setting and bargaining power, thus generally eroding agricultural revenue margins and farmers' willingness/capacity to invest and add value. The resilience, adaptive capacity and sustainability of food chains need to be analysed in a dynamic setting, whereby the strategic behaviour of chain agents and their interaction can be captured and their economic, social and environmental impacts assessed.

Scope: A holistic approach supported by new advances in theory, modelling and data gathering is needed to capture and understand the dynamics and interactions in food systems (from providers of farm inputs to consumers). The work will seek to capture drivers that influence chains' sustainability and their performance. An analysis is needed to map a wide range of (short and local food chains included as well as global value chains) food value chains across the EU and various sectors to give a thorough insight in upstream and downstream chain flows and interactions between chains. Special attention is required with respect to chain organisation, price transmission, information exchange, the behaviour of chain members, cost structure (including freight), organisation of logistics, institutional and organisational arrangements, marketing standards, balance of power, unfair trading practices, and the distribution of risk and added value along the entire food chain. Internal and external drivers influencing these factors should also be investigated. Proposals should map policies and regulatory requirements targeted at different chain levels (including consumption and internal market), so that interactions between them can be identified and their impact on chain performance in terms of resilience, integrity and sustainability can be understood. Changes in (global and local) demand, emerging dietary and consumption patterns, and how they impact on the organisation, adaptability and sustainability of food chains and vice versa is to be addressed. A foresight exercise should contribute to the formulation of potential future scenarios. The above-mentioned aspects should be analysed in a dynamic framework and contrasted with static conditions, in order to assess and improve resilience and sustainability. Finally, research should unravel the link between the complexity and diversity of the food systems and their efficiency, resilience and sustainability.

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

Expected Impact: The project results are expected to:

- provide an assessment of all dimensions of the sustainability of food chains and their contribution to jobs and growth, both territorially and at EU level;
- improve capacity to model the sustainability and resilience of food chains;
- enhance capacity to assess the functioning of value chains, upstream and downstream chain flows, and price transmission along the chain;
- improve knowledge on food chains and their underlying drivers;
- increase capacity to map the occurrence of unfair practices in the food chain and develop approaches to assess their (economic, environmental, social etc.) impact;
- clarify the development of added value and profit margins in food value chains and how these are distributed at each level;
- increase understanding of how consumers' demand and consumption patterns affect the organisation of food chains (and *vice versa*), and their sustainability and resilience; and
- improve the capacity of relevant policies and food chain stakeholders to improve food chain sustainability and resilience.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-34-2017: Innovative agri-food chains: unlocking the potential for competitiveness and sustainability

Specific Challenge: The sustainability of food systems is challenged by various interrelated factors, such as the changing socio-economic and political context, the scarcity of natural resources, environmental degradation and climate change. These challenges cannot be met by individual action, but require multi-stakeholder action and coordinated initiatives along the value chain. A new holistic, systemic approach to the design of processes within agro-food chains is needed to unlock their full potential and deliver economic, social and environmental benefits.

Scope: The research will provide in-depth insight into linkages and interactions between agri-food chain stakeholders, including understanding of their perception and behaviour with respect to sustainability objectives and cooperation, potentially resulting in the design of new processes leading to new business models and better performing value chains. A holistic approach to improving mutual understanding and cooperation between value chain stakeholders (identifying incentives and barriers, and strategies and tools, e.g. technologies to

overcome them) is to be explored, helping to create favourable conditions for cooperation, co-creation and innovation within value chains. The concept of social innovation and ways of measuring it throughout the value chain should be explored, taking into account the engagement of society. A plethora of policies and regulatory requirements influencing food production and consumption should be explored, and their implications as regards creating favourable overall conditions for cooperation and innovation along the food chain. Proposals should fall under the concept of the multi-actor approach[49].

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

Expected Impact: The project results are expected to:

- enhance the capacity of actors within agri-food chains to design new processes leading to new business models and more efficient, equitable, sustainable and better performing value chains;
- enhance the innovation potential of the European agri-food chains in terms of adapting to change and increase their competitiveness, sustainability and resilience;
- strengthen farmers' position in value chains through innovative approaches that enhance transparency, information flow and management capacity; and
- limit the negative impacts of agri-food chains on the environment, climate and health.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-35-2017: Innovative solutions for sustainable food packaging

Specific Challenge: In recent decades, there has been much research into innovative food packaging technologies and solutions (e.g. active, intelligent, recyclable, easy-to-use, organic, antibacterial). This includes research aimed at reducing the environmental footprint of packaging material, increasing the shelf-life of food and developing food spoilage indicators, improving product design, optimising process efficiency, and reducing the need for chemical preservatives while maintaining the nutritional and sensorial properties of food. In spite of the progress made, much remains to be done to overcome the barriers to market uptake of many promising technologies.

[49] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Scope: Proposals should clearly address the problems associated with the scaling-up and commercialisation of eco-innovative solutions to packaging in a developing framework of social, economic and environmental conditions. Activities should aim to produce plans and arrangements or designs for new, modified or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, pilot projects, large-scale product validation and market replication. Proposals may, if necessary, include limited research and development activities. If there are clear market failures or cultural or behavioural barriers to overcome, proposals may comprise activities such as validating the benefits for users/buyers, validating technical and economic performance at system level, validating standards, and activities to prepare market uptake, ensure consumer acceptance and optimise access to and the dissemination of results. Work is expected to benefit from contribution of social sciences and a gender approach. Participation of all relevant stakeholders in the food production and supply chains is encouraged. Demonstration activities will require the involvement of packaging and food processing companies, retailers and civil society organisations to bridge the gap between ideas that have been developed and their practical implementation.

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

Expected Impact: With a view to supporting the transition from a linear to a circular economy, proposals should show how some, or all, of the following impacts will be achieved:

- wider and faster deployment of innovative, user-driven, packaging solutions resulting from greater industry and consumer acceptance, and higher visibility of innovative solutions, overcoming the barriers to market uptake.
- reduced waste in both food and packaging materials, and its negative impacts on the environment (e.g. resource utilisation, greenhouse gas emissions, pollution).
- strengthening of the EU's position in manufacturing, improving competitiveness as well as opportunities for growth, diversification and job creation for the EU food and packaging sector in general, and SMEs in particular.
- strengthening the European food value chain through continued support to product quality, contributing to consumer trust and increased consumption.
- support for the transition from a linear to a circular economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

HEALTHY AND SAFE FOODS AND DIETS FOR ALL

Proposals are invited against the following topic(s):

SFS-36-2017: Co-fund on "One Health" (zoonoses – emerging threats)

Specific Challenge: Infectious diseases transmitted naturally from animals to humans (zoonoses), constitute major public health risks. In recent years, zoonoses have given rise to a number of human disease problems and anti-microbial resistance is also recognised as a global health threat. Especially when food-borne, zoonoses have significant social and financial impacts in Europe and need to be addressed by all those actors in the farm-to-fork food chain. Coherence in research is needed to better understand processes triggering and propagating zoonoses, their routing in the animal–human-environment triangle and their impact on public health. The means to control these diseases can be improved with a "one health" (i.e. holistic and transdisciplinary) approach involving synergies in various areas of research: human health, animal health food safety and environmental health. Action is needed at European level to identify and characterize risks in the field of food and feed safety, by developing capacity to collect and analyse information, and supporting research on state-of-the-art reference and surveillance tools, taking into account the harmonisation of existing and new diagnostic tests. Action needs to be undertaken in due time to identify the etiological agent. National research programmes in the area need to be further integrated and aligned and related policy activities, including forecasting activities for emerging threats, need further support. This will also add value and should be done in coordination with related European initiatives, bodies and projects and take into account relevant international bodies. There is also a need for research-based recommendations to prevent and control such (especially food-borne) zoonoses, to disseminate these recommendations effectively, to the various stakeholders (e.g. policy-makers, industry, citizens), and measure their impact on human and animal health.

Scope: The overall objective is to create a European joint programme to deal with zoonoses with an emphasis on zoonotic food-borne microbial infection and intoxication, including natural toxins and the risks associated with domesticated and wild animal reservoirs and their exposure routes towards human infection, including possible illegal imports of animal products, in order to improve preparedness against future 'one health' risks. Related emerging threats such as antimicrobial resistance will be addressed. The aim is to construct a sustainable framework for an integrated community of research groups including reference laboratories in the fields of life sciences, medicine, veterinary medicine, animal sciences and environmental sciences. This will lead to the joint programming and execution of research and other joint integrative activities such as information dissemination, education and training including knowledge management, access to strain collections, biobanks, experimental facilities and databases, including also harmonisation, standardisation, proficiency tests,

training, short-term missions, workshops and summer schools. The work will cover all agents involved, including viruses, bacteria, parasites and nucleotide sequences/genetic material conferring antimicrobial resistance. State-of-the-art technologies taking into account genomics research and modern tools, including biotechnological and epidemiological advances, will be used, also taking into account the harmonisation of diagnostic tests. An appropriate governance structure should be established to ensure effective implementation of the joint programme. Participating legal entities must be nominated by Member States or associated countries and have research funding and/or management responsibilities in the field of zoonoses, in particular for microbiological safety along the food chain. Coherence will be sought between the research activities and public and animal health policies. The acquired knowledge should support informed decision-taking and policy-making in the domain The activities will need to be coordinated with related European research related projects (e.g. EFFORT [50], COMPARE [51]), initiatives (e.g. JPI AMR [52], GloPID-R [53], International Research on animal health, see SFS-12-2016) and entities (e.g. EU reference laboratories, EFSA, ECDC) and take into account relevant international statutory bodies such as OIE, WHO and Codex Alimentarius.

Considering the budget available, the scope covered and the potential entities for this EJP, the Commission considers that an EU contribution to a maximum 50% of the total eligible costs of the action or up to 35 million EUR for the expected 5 year duration of the action would allow this specific challenge to be addressed appropriately. Up to one project will be funded.

Expected Impact: The project will lead to significant long term alignment of research strategies and activities at national and EU level, thus reducing unnecessary duplication of work on (especially food-borne) zoonoses. It will foster lasting transdisciplinary cooperation in the fields of life sciences, medicine, veterinary medicine, animal sciences and environmental sciences. It will advance understanding of the risks associated with zoonoses, their origin and pathways towards human infections. It will support risk management as regards zoonoses. It will facilitate knowledge dissemination, making beneficiaries aware of the risks and more responsible for their health.

Type of Action: COFUND (European Joint Programme)

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[50] http://www.effort-against-amr.eu/
[51] http://www.compare-project.org/
[52] http://www.jpiamr.eu/
[53] http://www.glopid-r.org/

SFS-37-2016: The impact of consumer practices in food safety: risks and mitigation strategies

Specific Challenge: Food safety policy is constantly reviewed in the light of new scientific evidence. There have been significant advances in consumer protection brought about by food safety legislation in the farm-to-retail part of the food chain. Examples include controlling the occurrence of certain food-borne pathogens at farm and retail level using microbiological targets and criteria, or of contaminants and other harmful chemicals by setting maximum residue limits and levels. The retail-to-fork part of the food chain, in the private consumer setting, cannot be legislated but may benefit from science-based policy initiatives. As regards food handling, logistics and preparation, both in-retail and post-retail consumer behaviour can substantially contribute to the risk from, and exposure to, certain food-borne hazards. This is the case in particular to those which are not effectively or easily managed earlier in the food chain, or that arise as a result of consumer practices.

An improved, consumer-driven, food safety approach requires scientific data on the impact of consumer practices on the risks of food-borne hazards. It also needs innovative strategies, technologies and tools to help consumers manage these risks and their exposure to food-borne hazards, while taking account of food sustainability. This should, in return, reduce food-borne disease and exposure to food-borne hazards. At the same time, it should contribute to the sustainability of the food chain and to improving the holistic "farm-to-fork" food safety framework.

Scope: Proposals should cover food-borne hazards and risks where consumer actions can help reduce risk and/or exposure.

Proposals should identify and consider different consumer risk-groups, taking into account socio-economic backgrounds and culture-based food handling practices in the EU. Where relevant, proposals should address gender-specific aspects, and the gender dimension in the research content shall be taken into account. Proposals should develop, test and implement novel and innovative strategies, technologies and tools to help consumers mitigate risks from food-borne hazards.

Interdisciplinary and multi-actor approaches are required. There should be input from the social sciences and humanities to engage with consumers in general. Civil society, consumer associations, the food industry and market actors should also be involved. Innovative and strategic food safety policy models, aimed at addressing and supporting the role of the consumer in food safety, should be proposed and analysed. Proposals should fall under the concept of the 'multi-actor approach'[54].

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9.5 million would allow this specific challenge to be addressed appropriately.

[54] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In order to reduce food-borne diseases and exposure to hazards, improve the sustainability of the food chain and improve the holistic "farm-to-fork" food safety framework, proposals should:

- help consumers mitigate risks from, and exposure to, food-borne hazards with the aim of reducing the occurrence of food-borne diseases;
- scientifically characterise the contribution of in-retail and post-retail private consumer behaviour (up to the point of consumption) to risks from, and exposure to, food-borne hazards, including due to logistical and food handling and food preparation practices;
- develop and stimulate market uptake using scientific evidence based approaches, tried-and-tested technologies and tools that enhance consumer-driven food safety;
- strengthen interdisciplinary research approaches and foster an inclusive and participatory multi-actor approach for long-lasting implementation of the results obtained.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-38-2016: Impulsivity and compulsivity and the link with nutrition, lifestyle and the socio-economic environment

Specific Challenge: Impulsivity (including hyperactivity, attention deficit, unplanned reactions, aggressiveness and other antisocial behaviours) and compulsivity disorders (including addictive behaviour) lead to individuals no longer being able to integrate into their social environment. As such, these disorders are a growing threat to individuals, families and societies as a whole. Antisocial and addictive behaviour can have a significant negative impact, e.g. in schools, at work, in families, in homes for the elderly, in prisons and in public places.

Many factors that may influence such behaviours are still not fully understood. These include the risks and protective factors, the extent to which inherited factors and nutritional habits may play a role, and the impact of these factors on the gut-microbiota-brain axis.

Recent studies have suggested that a change in diet and lifestyle can result in a significant reduction in impulsive, compulsive, aggressive or other antisocial behaviours.

Scope: Proposals shall include new insights into the influence of diet, including sugar, fat and protein content and metabolism, vitamin and mineral balance, amino-acids and food additives, and their impact on the gut-microbiota-brain axis. They shall also look at the influence of

lifestyle, socio-economic environment and variations in food culture on these behavioural disorders in various population groups (including children, teenagers and the elderly) and suggest possible solutions. In addition, consideration shall be given to the influence of these factors in the development of addictive behaviour. The gender dimension of these behavioural disorders must be taken into account and gender differences must be clearly investigated. An innovative research approach, including linked social innovation aspects, is needed and many stakeholders from a variety of disciplines shall be involved. This call does not envisage pharmaceutical treatment.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 12 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In order to find ways to improve impulsive, compulsive, aggressive or other antisocial behaviours through a change in diet and lifestyle, proposals should show how some, or all, of the following impacts could be achieved:

- Foster social innovation and public health by bridging knowledge gaps in the understanding of the influence of nutrition, lifestyle and the socio-economic environment, and their complex interdependencies, on the occurrence of impulsivity and compulsivity disorders.
- Deliver a list of scientific evidence-based remedial actions for this challenge that can be used by policy makers, politicians, practitioners, stakeholder groups, employers and the families or individuals concerned.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-39-2017: How to tackle the childhood obesity epidemic?

Specific Challenge: Childhood obesity is one of the most serious public health challenges of the 21st century and its prevalence has increased at an alarming rate in the last decades. The main problem is that overweight and obese children are likely to remain obese in adulthood and more likely to develop noncommunicable diseases like diabetes and cardiovascular diseases at a younger age. An integrated EU approach to help reduce the impact on health of poor nutrition, excess weight and obesity is a political objective. A wide range of factors interacting at various levels are known to be associated with obesity. Overweight and obesity, as well as their related diseases, are largely preventable. Starting from an early age, diet and lifestyle have a strong impact on health throughout life. Therefore, the prevention of childhood obesity needs to be given a high priority.

Scope: Within the context of improving the health of citizens and promoting sustainable economic growth, the main objective is to reduce childhood obesity and its comorbidities effectively. Proposals should focus primarily on specific target groups in the young (e.g., during pregnancy and foetal development, in infants, toddlers, most vulnerable groups in children, adolescents). To better understand the complex interactions between the factors influencing obesity in individuals and populations, it is necessary to combine the approaches and expertise from different disciplines (e.g. (epi)genetics, molecular biology, microbiome, gut-brain signalling, physiology, nutrition, physical activity sciences, information and communication technology, social sciences and humanities, education, environment, architectural and urban design, psychology). Proposals should consider a range of geographic, socio-economic, behavioural and cultural factors. Proposals should aim at innovative and efficient strategies, tools and/or programmes for promoting sustainable and healthy dietary behaviours and lifestyles. Proposals should reflect and build on existing initiatives and platforms and should provide a robust science-based impact assessment of the tools, strategies and/or programmes delivered for further consideration by policy makers. Tackling this societal challenge requires both interdisciplinary and multi-actor approaches engaging academics, policy makers, civil society and relevant industry and market actors. The gender dimension in the research content shall also be taken in 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. Proposals should fall under the concept of the 'multi-actor approach'[55].

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In the effort to tackle the childhood obesity epidemic, proposals should show how some, or all, of the following impacts will be achieved:

- Provide an understanding of which factors are involved and how they influence the childhood obesity epidemic.
- Provide innovative, efficient, effective, scientific evidence-based and ready-to-use tools, strategies and/or programmes to improve sustainable and healthy dietary behaviour and lifestyles in children.
- Transfer the generated knowledge and innovation to relevant stakeholders.
- Strengthen interdisciplinary research approaches and foster participatory and inclusive multi-actor approaches for long-lasting implementation of the results obtained.

Type of Action: Research and Innovation action

[55] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-40-2017: Sweeteners and sweetness enhancers

Specific Challenge: In recent decades, sweeteners and sweetness (flavour) enhancers (S&SEs) have become key ingredients in food produced and consumed in the EU, and exported to and from it. Because of their diversity (natural/artificial, geographical origin, processing, caloric content, etc.), S&SEs are used in different foodstuffs and food processes and in different dosages. However, information is lacking about new and emerging S&SEs throughout the agri-food chain, (e.g. their potential use in single or multiple food (ingredient) production chains, traceability, production and/or processing (cost) efficiency, safety and quality risks/benefits (for single or combined use), allergenicity and sustainability). The interaction of all these factors influences the role of S&SEs in a healthy diet and the fight against obesity. In addition, the toxicological impact of high doses, combined effects and the prolonged use of S&SEs are still unknown and the health-related aspects need further investigation.

Scope: Proposals should focus on health, obesity and safety aspects (including combined/prolonged use, metabolic effects and gut brain signalling, neuro-behaviour, and effects on the microbiota) associated with S&SEs. Activities indicated in the proposals should explore the sustainability of the whole value chain (ingredient sourcing, production/processing, market opportunities for new and emerging S&SEs). They should investigate consumer perceptions and preferences giving proper consideration to the underlying physiological, psychological and socio-economic drivers. The approach should be interdisciplinary and should give careful and detailed consideration to the regulatory framework. Proposals should also include dissemination to all stakeholders as well as the food industry, including small and medium-sized enterprises (SMEs). Where relevant, proposals should address gender-specific aspects and the gender dimension in the research content shall be taken into account.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: With the objective of combating obesity, while improving sustainable food security in the EU, proposals should show how some, or all, of the following impacts will be achieved:

- Promote healthy diets and contribute to combating obesity while improving sustainable food security in the EU.
- Stimulate market uptake (with a specific focus on small and medium-sized enterprises) of new, healthy and sustainable S&SEs.

- Strengthen the EU economy with a move towards more sustainable and future-oriented business practices.
- Dissemination to EU food, health and food ingredient stakeholders, especially to food-related SMEs.
- Evidence-based policy inputs on health, environmental and food safety issues.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SUPPORT TO THE IMPLEMENTATION OF THE EU-AFRICA PARTNERSHIP ON FOOD AND NUTRITION SECURITY AND SUSTAINABLE AGRICULTURE

The establishment of a structured partnership between the EU and the African Union will be accompanied by several actions. They are being launched to support the EU-Africa High Level Policy Dialogue on science, technology and innovation and the implementation of the jointly funded EU-Africa Research and Innovation Partnership focusing on food and nutrition security and sustainable agriculture (endorsed by the EU-Africa Summit 2014) taking into account the draft roadmap that is being developed jointly towards this aim. Contributions from a stakeholder consultation have been taken into account.

The actions include an ERA-NET Cofund action (SFS-41), a research and innovation action on linking actors in innovation (SFS-42), a research and innovation action on earth observation services for monitoring agricultural production (SFS-43) and opportunities in research infrastructure collaboration (European Research Infrastructure topic INFRASUPP-01-2016: Policy and international cooperation measures for research infrastructures).

Proposals are invited against the following topic(s):

SFS-41-2016: EU-Africa Research and Innovation partnership on food and nutrition security and sustainable agriculture

Specific Challenge: Access to food remains a global challenge, with 805 million people not having enough to eat (global hunger index 2014). Nutritional imbalances in Europe and Africa are increasing, characterised by persistent under-nutrition and growing diet-related diseases. It is projected that the global population will increase from 7 billion to more than 9 billion by 2050. The majority of this growth is expected to take place in Africa. Food availability needs to increase in the context of a changing climate with agricultural production systems under threat from extreme weather events, as well as in view of declining natural resources, particularly water, soil and biodiversity. Food losses from harvest to consumer households have to be reduced. Increasing the quantity of food produced will not be a sufficient answer in itself as food security is an issue not only of food production but also of

access to food, affordability, stability of the food supply and the quality of that supply, beyond its basic calorie value. Hence there is a need to harness science and farmer knowledge to advance an innovation process.

Scope: Proposals should pool the necessary financial resources from the participating national or international research programmes with a view to implementing a joint call for proposals. The call should result in grants to third parties with EU co-funding. To achieve these objectives, a long-term research and innovation partnership would lead to a joint and coordinated effort of African and European actors in an innovation system along the lines of three broad thematic areas:

Sustainable intensification: Providing food in a sustainable manner is a challenge in both Europe and Africa. They therefore have a common interest in research on sustainable intensification. Research and innovation actions are needed to both improve the production of food/fibre/biomass and of services (social, economic and environmental) and to reduce the environmental impact of such production and the depletion of natural resources. Ecological intensification approaches such as conservation agriculture, integrated pest management, organic agriculture, which optimise the use of ecosystem services to produce quality food in a competitive manner, include breeding of crops and animals, nutrient management and research on institutional innovations.

Agriculture and food systems for nutrition: Agricultural and food systems need to be changed to reduce waste and improve diets. Aquaculture and coastal fisheries should be part of the approach. Both under-nutrition and obesity are associated with micronutrient deficiency (food intake is low in minerals and vitamins), which affects two billion people worldwide. Research and innovation actions would look at developing low-waste food value chains to deliver more nutritionally-rich food to consumers. This should include urban agriculture and better rural-urban linkages. A better understanding of consumer behaviour in relation to healthy diets could help improve regulations, the education and incentive system.

Improvement of agricultural markets and trade: Agriculture remains a primary means of economic growth for many African countries. Market and trade development will play an important role in the creation of future jobs and growth, especially in rural areas. Europe is a major growth market for African agricultural exports. Research into improved global value chains would benefit small farmers and consumers alike and would expand the market opportunities for organic, fair-trade and other quality label production. It could also help operators in developing countries adapt to new regulatory conditions, such as the new rules on organic production currently being discussed.

The joint call must be implemented jointly by European and African countries and could include other national or international funders such as foundations, public and non-governmental agencies or international research programmes (e.g. CGIAR research programmes). The joint call should also build on earlier experiences of this kind of cooperation, such as the international ERA-NET, ERAfrica or the ERA-NET ERA-ARD. It

should also launch calls for innovation projects building on research results obtained from previous projects in the domain. Proposals will be expected to establish relevant links with other projects concerning the preparation of the EU-Africa Research and Innovation Partnership on food and nutrition and sustainable agriculture.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- Effective trans-national, European-African research and innovation networking and better coordination and synergies between national, international and EU research programmes relevant to food and nutrition security and sustainable agriculture.
- Support for the development of a long-term EU-Africa Research and Innovation Partnership on food and nutrition security and sustainable agriculture, connecting research and innovation networks to local multi-stakeholder research and innovation processes.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-42-2016: Promoting food and nutrition security and sustainable agriculture in Africa: the role of innovation

Specific Challenge: Scientific cooperation with Africa on agriculture is critical to achieving sustainable food and nutrition security. To prepare of the EU-Africa Research and Innovation Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA), it is considered necessary to investigate how to support innovation processes allowing acquired knowledge to be more widely disseminated and mobilised and have greater impact. Moreover, extension and advisory services (EASs), which are a critical part of innovation systems, have seen profound changes in recent decades in Africa: they have been privatised and decentralised and the thematic content and the objectives of their missions have also evolved. Various EASs coexist, with uneven coverage and delivery.

Scope: Proposals will review the various approaches towards innovation promoted and implemented in past and present activities in Africa or other regions in the world as a basis for developing a strategy for fostering innovation and enhancing the impact of the EU-Africa Research and Innovation Partnership on FNSSA. This strategy will look at the involvement of various categories of stakeholders in all stages of the research process and include elements related to the linkages with farmers' organisations and ways of empowering farmers, the role

of civil society organisations, the role of advisory services, private sector and other intermediaries both at the value chain and territorial scale. It will develop and test relevant approaches scaling out of results achieved through EU-Africa cooperation on research and innovation. Proposals will also include mappings of national EASs in African countries, elaborating EAS typologies. The capacity of the EASs to facilitate appropriate links between researchers and other (private and public) actors in innovation systems will be assessed. Various farming approaches will be covered, including the organic sector. Particular attention will be paid to orientations given through governance mechanisms (particularly in terms of farmers' involvement in orientation and programming) and funding.

Proposals should secure the commitment and participation of a variety of concerned partners established in the EU and in Africa and should develop and implement pilot innovation actions. Proposals will be expected to establish relevant links with other projects involved in the preparation of the EU-Africa Research and Innovation Partnership on FNSSA. Proposals should fall under the concept of the 'multi-actor approach'[56].

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

Expected Impact: Activities will contribute to:

In the short term:

- delivery of relevant activities, schemes, approaches and strategies through pilot actions to foster innovation in FNSSA in Africa and to achieve widespread local impact;
- support for the development of an EU-Africa Research and Innovation Partnership on FNSSA; and
- recommendations for relevant policies in support of innovation processes (agricultural and agricultural knowledge and innovation systems (AKIS) and cooperation policies), in particular as regards linking local innovation needs to a research agenda and the role of knowledge brokers such as EAS.

In the long term:

- increased capacity of multi-actor groups to innovate; and
- improved implementation of research and innovation results in the farming sector in Africa.

Type of Action: Research and Innovation action

[56] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-43-2017: Earth observation services for the monitoring of agricultural production in Africa

Specific Challenge: The Fourth EU-Africa Summit of 2-3 April 2014 agreed on a roadmap for 2014-2017[57] including actions specifically targeted at delivering Earth observation services in priority domains for Africa such as food security. This topic aims to contribute to this roadmap by providing food supply projection and agricultural risk assessment for Africa. These kinds of projection remain very challenging tasks, requiring a lot of information on environmental and weather conditions, climate change, crops and livestock. This information is usually derived from both remote and in-situ Earth observation systems. The challenge is therefore to make agricultural production in Africa more predictable by using Earth observation assets, including – but not limited to – those made available through the Global Earth Observation System of Systems (GEOSS) and Copernicus programmes.

Scope: The action should lead to substantially increasing the use of Earth observing capabilities and supporting application systems to produce timely, objective, reliable, and transparent crop and livestock production projection at the national and regional level for the African continent. It should support the GEOGLAM[58] and AfriGEOSS[59] initiatives and relevant aspects of the EU's development policy. Moreover, it should design and develop methods to assess/monitor agricultural production in Africa, taking into account its main drivers and the longer term impacts of its dynamics. Building on the outcomes of existing EU projects stimulating innovation for global agricultural monitoring – such as SIGMA[60] –, the research and innovation activities should cover as a minimum all the following domains: crop and livestock identification and crop and livestock area estimation, crop and livestock condition and stress, yield prediction and forecasting, crop cover mapping, and the impact of extreme events on food production.

The action should foster participatory approaches to collecting relevant information and data, taking advantage of the growing number of mobile communication devices owned by African citizens. The participatory approaches should also take into account, and build on, widespread women's engagement in agricultural production and food supply. There should be an emphasis on 'consensus of evidence approaches', integrating data from multiple sources including Earth observations, crop models, weather forecast, climate predictions and projections, surveys and ground observations to reach evidence-based assessments using repeatable and scientifically sound methods.

57 http://www.africa-eu-partnership.org/sites/default/files/documents/
58 http://www.geoglam-crop-monitor.org/
59 http://www.earthobservations.org/afrigeoss.php
60 http://www.geoglam-sigma.info/

Large proof-of-concept actions, showing the capacity to deliver food supply prediction and agriculture risk assessment beyond the current state-of-the art at regional/pan-African level should be performed by the action. Proposals should contribute to supporting the implementation of an EU-Africa partnership on Food and Nutrition Security and Sustainable Agriculture and should include partners clearly representing the diversity of African countries.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with African countries. The action should establish cooperation with institutions/networks engaged in the development of climate services in Africa and with agencies which have developed mapping and assessment tools used in humanitarian decision making.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to:

- move projection of food supply and agricultural risk assessment at the level of the African continent beyond the current capability;
- improve decision making capacity regarding food supply and management in Africa;
- contribute to independent and neutral evaluation of agricultural production in Africa;
- strengthen collaboration between EU and African organisations in the domain of food projection;
- increased involvement of citizens and stakeholders in food production and food supply chain management in Africa, taking into account the gender dimension and women's role in food production and supply;
- provide a strong Earth observation building blocks for an EU-Africa Research and Innovation Partnership focusing on food and nutrition security and sustainable agriculture;
- improve participation of African organisations in GEO and Copernicus (GMES & Africa initiative);
- foster cooperation with initiatives developing the Global Framework for Climate Services (GFCS)[61] in African countries.

Type of Action: Research and Innovation action

[61] www.gfcs-climate.org/

The conditions related to this topic are provided at the end of this call and in the General Annexes.

IMPLEMENTATION OF THE EU-CHINA FAB FLAGSHIP INITIATIVE

By signing a letter of intent on research and innovation cooperation in food, agriculture and biotechnology (FAB) in November 2013, the European Commission and the Chinese Academy of Agricultural Sciences (CAAS) agreed to work towards an ambitious strategic long-term partnership and the FAB 'flagship initiative' was launched. Building on that agreement, the EU-China Task Force on FAB has developed specific common priorities for research and innovation cooperation; these are reflected in topics SFS-44 to SFS-48.

Regarding topic SFS-48, the following topics can provide further opportunities of funding in the related area of 'Sustainable cities through nature-based solutions' under the call 'Smart and Sustainable Cities' (call ID: H2020-SCC-2016/2017):

- SCC-02-2016-2017: Demonstrating innovative nature-based solutions in cities

- SCC-03-2016: New governance, business, financing models and economic impact assessment tools for sustainable cities with nature-based solutions (urban re-naturing)

- SCC-04-2016: Sustainable urbanisation

Proposals are invited against the following topic(s):

SFS-44-2016: A joint plant breeding programme to decrease the EU's and China's dependency on protein imports

Specific Challenge: Legume crops are a critical source of plant-based proteins for people and animals. To date, however, they have not featured high on public or private sector research agendas. The EU and China are facing similar challenges, as both lack sources of protein and are increasingly dependent on protein imports for food and animal feed. In recent years (mainly due to continuous population growth and urbanisation), China has imported increasing volumes of soybeans, reaching 60 million tonnes in 2013 (corresponding to 60% of world market trade). This unique situation for a commodity will have important consequences on the equilibrium of the global market and might affect prices in the near future if imports increase further, as indicated by most recent long-term projections. The EU and China therefore have a common interest in cooperating on long-term strategies to develop sustainable alternatives to protein imports with a view to reducing their dependency and helping to stabilise the world market.

Scope: Proposals will develop efficient long-term breeding strategies to improve diversification, crop productivity and stability, and the protein quality of (grain and forage) legume crops for human and animal food. Activities will seek to broaden the genetic base of legume crops for breeding purposes, analyse relevant and untapped genetic material and

explore the scope for increased exchanges between the EU and China via mutual access to gene banks through open databases. Proposals will test plant performance (phenotyping) of a wide range of legume species and varieties in various geographic (climatic) and environmental situations in the EU and China, taking into account climate-change scenarios. Activities will identify species and varieties suited to a number of specific agro-ecological conditions: specific attention should be given to identifying resistance to combinations of biotic and abiotic stresses (including heat and drought stress tolerance). Proposals will make use of a wide range of breeding tools and methods available in the EU and China.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact:

- reduce overall long-term depedency of European and Chinese agricultural systems on protein imports;
- enlarged range of genetic resources of legume crops available for use in breeding programmes;
- enhanced common methods, tools and technologies for the characterisation and evaluation of new genetic resources;
- improve mutual access to genetic resources;
- new varieties adapted to local conditions in order to increase the overall productivity and quality of legume crops that should benefit both conventional and organic agriculture; and
- new varieties adapted to biotic and abiotic stresses in the context of climate change.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-45-2016: Increase overall transparency of processed agri-food products

Specific Challenge: In recent years, EU-China trade relations have grown very fast and agriculture has become an important sector for EU imports from and exports to China. However, many trade barriers relating to safety issues, standardisation and traceability (including fraud) in agri-food products persist and hamper trade predictability. In addition, there is a need to contribute to the prevention of major food safety crisis throughout the whole

food chain, to meet consumer expectations for international standards and ensure the authenticity of high quality products such as those covered by Geographical Indications (GIs). Implementing food-safety management systems along the food chain is key to creating better overall framework conditions for innovation, in particular fostering marketing of innovative products and new technologies.

Scope: Proposals will contribute to the development of food-safety management systems for processed agri-food products that will enhance the overall transparency of the food chain. The complex issue of the supply chain for packaging (including the origin of raw material) will be dedicated specific attention. The traceability concept will also be subject to further analysis as its correct worldwide application is key to preventing the spread of food safety risk in a crisis and an important tool in overall GI policy. Proposals should develop specific models, tools, technologies and testing methods based on risk analysis to be implemented eventually by agri-food manufacturers and agri-food operators in Europe and China. Proposals should deliver a good-practice guide supporting better food safety management systems and implement demonstration and pilot activities in key sectors. Exchange and convergence of best practices between the EU and China, training of experts and cooperation between laboratories to ensure equal performances of laboratories to facilitate the harmonisation of food safety standards will be essential. Proposals are expected to produce feasibility studies for a sustainable EU-China joint laboratory that will aim to ensure compliance with the limits established by the standards in accordance with harmonised testing procedures. Proposals will look at production sectors in which the work is likely to have the greatest impact in terms both of potential risks and commercial value, such as wines and spirits, dairy products, processed meat and fruit and vegetables.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese partners will come in addition and will be made available by China.

Expected Impact:

- contribute to the development of a common EU-China vision of global food safety issues that will increase trade and improve trade predictability in key production areas;
- increase consumer confidence in processed agri-food products traded between the EU and China and in domestic markets;
- improve the transparency of the food chain and manufacturers' sense of responsibility, in particular as regards processed agri-food products
- reduce human health risks linked to food processing and packaging;
- improve traceability tools along the food and feed chains; and

- increase EU-China cooperation at technical and scientific levels.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-46-2017: Alternative production system to address anti-microbial drug usage, animal welfare and the impact on health

Specific Challenge: Confined systems dominate in modern livestock production worldwide, in particular as regards monogastric species. These systems often constrain natural animal behaviour and may result in health problems and product quality issues. The EU and China are facing a similar challenge, though not to the same extent. Efforts to maximise production and ensure product safety often involve overuse of anti-microbial drugs in farm animals either in veterinary treatment, or for growth-promoting purposes in those countries where they are allowed. Drug residues may accumulate in animal products and the environment, lead to food quality issues and constitute a risk for consumers. Welfare and environmentally-friendly production systems may improve animals' immunity and health conditions, and reduce veterinary drug use, in combination with other measures such as good husbandry practices and biosecurity. The EU has an increasingly active policy on improving animal welfare and fighting the threat of anti-microbial resistance. As China is seeing high levels of veterinary drug use in increasingly intensive production systems, it has an interest in cooperating with the EU on strategies to make those systems more sustainable.

Scope: Focusing on monogastric species in confined intensive systems, the proposed research activities should assess the links between livestock welfare and health, the underlying factors, the related use of anti-microbial drugs and the subsequent presence of residues in products and their spread into the environment. They should in particular address immunity and health, biosecurity measures and residue detection. The activities should develop possible means, including tools, methods and schemes, by which more welfare-friendly production systems can help improve health and reduce the use of veterinary drugs. The proposed activities should, where possible, measure the potential impact of the proposed measures, including the socio-economic aspects and the scope for establishing schemes (standard-setting, management, policy, monitoring and verification components).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact:

- welfare-friendly production systems (housing, equipment, technology) to improve farm animal immunity, health and welfare effectively;
- reduced veterinary drug use at farm level and reduced residue in animal products in order to improve food safety;
- improved biosecurity at farm level; and
- contribution to the development of common legislation and standard-setting in the EU and China

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-47-2017: Management of soil water resources in the EU and China and its impact on agro-ecosystem functions

Specific Challenge: Soil is the largest terrestrial water reservoir and a decisive factor in crop production and yield variability. A shortage of water to sustain crop production systems and other agro-ecosystem services is a major issue in many Mediterranean areas of the EU and climatic projections suggest that precipitation will become increasingly variable and unreliable in the near future. As many parts of China are facing similar problems, there is a common interest in increasing cooperation on this key issue to promote sustainable production systems in a changing environment.

Scope: Proposals will provide a platform for research on soil-water resources management based on a system approach by considering a number of regional climate scenarios in Europe and China. Activities will include the assessment of the function between crop yield variability and soil hydraulic properties by linking data and models from long-term experiments. Linkages between agricultural soil hydrology and threats will have to be systematically assessed and adaptation and mitigation methods provided, taking into account land-use dynamics, economic context and social aspects of soil water management. Proposals will develop and test good practices for sustainable on-farm water management and watershed practices adapted to local conditions (conventional and advanced technologies). Optimising circular approaches to re-use water and make use of waste water might also be envisaged in a comprehensive approach to water management in agricultural production systems.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact:

- improved soil and water-use efficiency in agricultural production;
- Identication of tools, mainly at farm level, to improve soils' water-holding capacities and plant productivity in the presence of drought or flood risks. To be effective, the practices need to be conducted at farm level and then upscaled regionally;
- identification of new and advanced sustainable technologies for soil-water management that will efficiently reduce crop-yield variability and the impact of extreme weather events on crops; and
- evaluation and study of water balances at watershed level and evaluation of crops' real 'water footprint'.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-48-2017: Resource-efficient urban agriculture for multiple benefits – contribution to the EU-China Urbanisation Partnership

Specific Challenge: With increasing urbanisation, massive daily flows of agricultural products, water and energy coming from rural/remote areas to cities generate high amounts of heat, CO_2, waste water and other waste. In certain contexts, urban agriculture has been shown to improve food security and to bring economic, environmental and social benefits to cities. Given the diversity of urban agricultural systems emerging worldwide, there is a need to demonstrate and assess how technological and social innovation in urban agriculture can help overcome the shortcomings of urban food systems while providing cities with other ecosystem services (e.g. mitigating climate change, closing nutrient cycles) and improving the resilience of urban areas.

Scope: The proposals should develop innovative integrated urban farming systems that use resources (e.g. space, energy, water, nutrients) more efficiently and re-use or recycle heat, water, CO_2, waste or by-products from urban sources (e.g. industry, households) for horticultural production (e.g. fruits, vegetables, herbs, sprouts, mushrooms, algae, ornamental trees and plants). The production and use of renewable energies (e.g. solar/wind energy, biogas) in these farming systems will also be investigated. Activities should showcase several resource-efficient production systems in open or controlled environments, thereby providing a demonstration (at TRL 6-8) for the production of safe and high-quality products in different urban spaces (e.g. rooftop/vertical farming, individual/collective gardens, other unused spaces).

The work should be carried out at least in one European city and in one Chinese city. Breeding activities are excluded.

The work will support the development of innovative production systems both conventional and organic and their associated value chains in cooperation with relevant local actors and stakeholders, and according to business models that target economic and social benefits. Attention will be paid to land use issues in particular in relation to urban-rural interactions (e.g. urban sprawl dynamics). Evaluation methods of multi-functional urban agriculture should be used to assess the contribution of these systems and value chains to cities' food security, and their economic, environmental and social impacts on the urban communities. A cost-benefit analysis of urban farming production systems and associated value chains should compare these to other options (including peri-urban and rural agriculture). Policy recommendations and best-practices guides for sustainable urban farming systems should be produced and knowledge platforms promoted.

Proposals should fall under the concept of the 'multi-actor approach'[62] targeting all relevant actors such as researchers/technology providers, public authorities, and private actors (e.g. restaurants, retailers, urban farmers, real estate businesses) and promote the engagement of urban communities. SME participation is encouraged.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact: Applicants will gauge the expected impact of the project as regards:

- the creation of shorter supply chains for safe, high-quality food and other horticultural products that reduce European and Chinese cities' ecological footprint by limiting losses and energy in transport and contribute to their food security;
- resource-efficient low-carbon urban farming systems that:
    - consume low amounts of water, energy, fertilisers, pesticides and space;
    - use waste heat, CO_2, waste and rain water and other waste or by-products from urban source, contributing to the development of the circular economy;
    - minimise environmental impacts;
- improved knowledge of various business models for urban farming, including a thorough understanding of their potential for development, performance and impact on urban food systems in economic, environmental and social terms, and success factors or reasons for failures; and

[62] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- increased cooperation at international level, in particular involving exchanges of knowledge and best practices between the EU and China.

In the longer term, the results should contribute to a more sustainable and resilient urban development, in particular via the provision of ecosystem services (e.g. reduced air pollution, better water retention thus limiting floods, biodiversity, carbon sinks, recreation, greener urban landscapes), social cohesion and jobs creation.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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

Opening date(s), deadline(s), indicative budget(s):[63]

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 27 Oct 2015			
SFS-12-2016 (CSA)	3.00		17 Feb 2016
SFS-19-2016 (ERA-NET-Cofund)	15.00		
SFS-24-2016 (CSA)	2.00		
SFS-25-2016 (CSA)	2.00		
SFS-41-2016 (ERA-NET-Cofund)	10.00		
SFS-01-2016 (RIA)	12.00		17 Feb 2016 (First stage) 13 Sep 2016 (Second stage)
SFS-02-2016 (RIA)	10.00		
SFS-03-2016 (RIA)	5.00		
SFS-06-2016 (RIA)	7.00		
SFS-07-2016-2017 (RIA)	8.00		

[63] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
All deadlines are at 17.00.00 Brussels local time.
The Director-General responsible may delay the deadline(s) by up to two months.
The deadline(s) in 2017 are indicative and subject to a separate financing decision for 2017.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

SFS-11-2016 (RIA)	12.00		
SFS-14-2016 (RIA)	11.00		
SFS-15-2016-2017 (RIA)	7.00		
SFS-21-2016/2017 (RIA) SFS-23-2016 (RIA)	12.00		
SFS-26-2016 (RIA)	10.00		
SFS-31-2016 (RIA)	5.00		
SFS-33-2016 (RIA)	6.00		
SFS-37-2016 (RIA)	9.50		
SFS-38-2016 (RIA)	12.00		
SFS-42-2016 (RIA)	5.00		
SFS-44-2016 (RIA)	5.00		
SFS-45-2016 (RIA)	5.00		
SFS-09-2016 (RIA)	7.00		17 Feb 2016
Opening: 15 Mar 2016			
SFS-18-2016 (FPA)			13 Sep 2016
Opening: 04 Oct 2016			
SFS-04-2017 (CSA)		2.00	14 Feb 2017
SFS-05-2017 (RIA)		7.00 [64]	

[64] of which EUR 7.00 million from 'Information and Communication Technologies '.

SFS-13-2017 (IA)		6.00	
SFS-22-2017 (IA)		6.00	
SFS-35-2017 (IA)		12.00	
SFS-36-2017 (COFUND-EJP)		35.00	
SFS-43-2017 (RIA)		10.00 [65]	
SFS-48-2017 (IA)		7.00	
SFS-07-2016-2017 (RIA)		12.00	14 Feb 2017 (First stage) 13 Sep 2017 (Second stage)
SFS-08-2017 (RIA)		8.00	
SFS-10-2017 (RIA)		15.00	
SFS-15-2016-2017 (RIA)		7.00	
SFS-16-2017 (RIA)		9.00	
SFS-17-2017 (RIA)		10.00	
SFS-20-2017 (RIA)		6.00	
SFS-21-2016/2017 (RIA)		5.00	
SFS-27-2017 (RIA)		10.00	
SFS-28-2017 (RIA)		10.00	
SFS-29-2017 (RIA)		5.00	
SFS-30-2017 (RIA)		12.00	
SFS-32-2017 (RIA)		12.00	

[65] of which EUR 10.00 million from 'Climate action, environment, resource efficiency and raw materials'.

SFS-34-2017 (RIA)		6.00	
SFS-39-2017 (RIA)		20.00	
SFS-40-2017 (RIA)		9.00	
SFS-46-2017 (RIA)		5.00	
SFS-47-2017 (RIA)		5.00	
Overall indicative budget	180.50	251.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme with the following exceptions:

SFS-48-2017	In the context of the EU-China Urbanisation Partnership, each project shall involve at least one city from Member States and/or Associated Countries and one Chinese city, where demonstration activities will be performed as defined in the topic text.
SFS-42-2016	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 five participants from Africa.

SFS-11-2016	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 two participants from third countries.
SFS-41-2016	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 five participants from Africa.
SFS-25-2016	Only legal entities from EU Member States and Associated Countries, in charge of national research and innovation programmes and policy in the Societal Challenge 2 - Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy, are eligible to participate in the consortium.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes with the following exceptions:

SFS-21-2016/2017, SFS-23-2016	At least one project (above the evaluation threshold) per topic will be funded

The full evaluation procedure is described in the relevant guide published on the Participant Portal.

Consortium agreement: Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement. Participants in the Framework Partnership Agreement for ERA-NET Cofund actions do not have to sign a consortium agreement since each Specific Grant Agreement will require a consortium agreement.

Call - Blue Growth - Demonstrating an ocean of opportunities

H2020-BG-2016-2017

INTRODUCTION

In a context of growing demand for resources and maritime services including transport, sustainably capturing and demonstrating the potential of seas and oceans is critical to turning this potential into an asset with long-lasting economic, social and environmental benefits for Europe. Targeted innovation in our seas and oceans and an optimal use of the wide variety of research infrastructures available can play a key role in tackling global challenges such as the scarcity and vulnerability of strategic resources (e.g. for food, energy, transport, etc.), while providing valuable ecosystem services factoring in climate change. This has the potential to provide more jobs, growth, renewable energy sources and climate-smart solutions. However, a risky environment, insufficient knowledge, data, data access, and uncertain financial and legal frameworks are critical barriers to overcome.

EU intervention is therefore needed to bridge these gaps and create the conditions for mobilising investment in testing and demonstration projects for new technologies, bringing them 'from lab to market' and avoiding the costly duplication of work.

The Blue Growth Focus Area detailed in Work Programme 2016 – 2017 will fully address cross-cutting marine and maritime research as specifically called for in the Specific Programme implementing Horizon 2020. It will bring technologies to the readiness level needed for commercial applications and will improve current European marine observing, surveying and monitoring capabilities in order to increase our knowledge and understanding of the complex marine environment and its interaction with human activities. Finally, it will maximise synergies with activities funded at national and regional levels.

This Focus Area is based on four interlinked pillars, all of which include the mainstreaming of skills and competence development:

1) Boosting innovation for emerging Blue Growth activities: the objective is to test, demonstrate, scale-up and bring to the market existing or new sustainable marine and maritime technologies, and support innovative products and the development of new services while respecting marine ecosystems.

2) Linking healthy oceans and seas with healthy people: the objective is to explore the interactions between the human dimension, ocean health and marine ecosystem services.

3) The Arctic dimension: the objective is to deepen knowledge and identify sustainable and innovative approaches to tackle the challenges that climate change is posing in the Arctic region. The Arctic is the region of the globe where climate is changing the most rapidly. This is a source of risks, but is opening up new opportunities as well. New transport routes, access

to vast and previously not accessible resources and the shifting to the north of fish stocks all increase the strategic importance of the Arctic. In addition, changes in the Arctic have global consequences such as sea-level rise, changing weather patterns and more extreme weather events, with socio-economic impacts on the EU. The Arctic is as well a region where research is key. Its rapid changes require research to study its processes and improve our predictive capability their evolution. The need to protect unique and fragile environments, together with the constraints of working under extreme conditions, requires a close link between research and operational activities. Sustainability issues in the Arctic must also consider indigenous communities and the use of traditional knowledge. Moreover, international scientific cooperation is necessary as, due to the complex logistical constraints, no single country can work on its own. The Arctic may become a test bed for sustainable innovation and science diplomacy.

4) Valorising the Mediterranean Sea Basin: the objective is to deepen knowledge on the Mediterranean marine ecosystems and their services and to strengthen the European ocean observing, surveying and monitoring capabilities and related technologies necessary for accelerating the production of high-resolution maps and assessments. The Mediterranean Sea is going through rapid changes in response to closely interlinked natural and anthropogenic pressures. In addition, the geo-political complexity of the area adds further difficulties concerning the establishment of favourable framework conditions to support the growth of a blue economy (e.g. in trans-border cooperation in sea-related activities, including maritime spatial planning).The Blue Growth Focus Area will contribute to the realisation of the 'Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area' (The BLUEMED Initiative) which aims to create a healthier, more productive, resilient, better known and valued Mediterranean Sea, enabling science diplomacy.

This Focus Area contributes to implementing the EU Strategy for international cooperation in research and innovation[66] and to other commitments such as the Galway Statement (on the Arctic), the BLUEMED Initiative[67] and cooperation with South-East Asian countries in the field of aquaculture[68], as well as the other EU macro-regional strategies and ongoing activities in Regional Seas Conventions.

[66] COM(2012) 497 of 14.9.2012. 'Enhancing and focusing EU international cooperation in research and innovation: A strategic approach'

[67] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio-economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

[68] In 2007, the Nuremberg Declaration on an Enhanced EU-ASEAN Partnership was signed at the 16th Ministerial Meeting, in Nuremberg. In 2012, Foreign Ministers of ASEAN and the EU adopted the Bandar Seri Begawan Plan of Action 2013-2017, defining ASEAN-EU cooperation in the next five years.

This Focus Area has cross-cutting activities with other areas of Horizon 2020, such as *Secure, clean and efficient energy* (Societal Challenge 3), *Smart, Green and Integrated Transport* (Societal Challenge 4), *Climate action, environment, resource efficiency and raw materials* (Societal Challenge 5) and *Leadership in Enabling and Industrial Technologies* (LEIT).

Wherever possible, applicants may seek synergies with other sources of funding and relevant national/ regional research and innovation programmes including European Structural and Investment Funds in connection with smart specialisation strategies.

Synergies and/or complementarities will be welcome across projects selected for funding within Societal Challenge 2; for example, between those in the Blue Growth Focus Area and the Rural Renaissance call tackling domains like healthy oceans and seas for healthy people e.g. "BG-8-2017: Innovative sustainable solutions for improving the safety and dietary properties of seafood" in connection with new approaches towards policies and governance e.g. "RUR-2-2017: Coastal-rural interactions: Enhancing synergies between land and sea-based activities".

All activities funded under this call should, insofar as is possible, use data resulting from or made available through different initiatives of the European Commission. In particular, the utilisation of GEOSS (Global Earth Observation System of Systems)[69] and Copernicus (the European Earth Observation Programme) [70] data, products and information should be prioritised. Likewise, in line with EU cooperation with the European Space Agency (ESA), activities should use ESA Earth Science data as far as is possible. The data, both from ESA missions or third party missions, are for the vast majority of cases available for free web download (further details are available at http://eopi.esa.int).

BOOSTING INNOVATION FOR EMERGING BLUE GROWTH ACTIVITIES

Proposals are invited against the following topic(s):

[69] www.geoportal.org

[70] www.copernicus.eu. The Copernicus data and products, where available, should be used by the research and innovation community following the free, full and open access approach approved in the Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013. This includes the data from the Copernicus space infrastructure (Sentinel missions) and, where affordable, the Copernicus Contribution mission data, where the latter can be of use for Horizon 2020 projects developing new Copernicus Services. Applicants are advised to consult published information on the availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data at the Commission's web http://ec.europa.eu/growth/sectors/space/research/index_en.htm. Wherever possible, applicants are also encouraged to use the Earth Observation Data Warehouse (http://copernicusdata.esa.int/web/cscda/home).

BG-01-2016: Large-scale algae biomass integrated biorefineries

Specific Challenge: In a context of growing demand for resources and competition for land use, sustainably capturing the potential of seas and oceans is critical for the European Union. New markets, services and products will only arise from innovative, resource-efficient and integrated approaches which cut across economic sectors such as marine biomass integrated bio-refineries. Despite the large potential of products derived from algae, implementation is still limited mainly due to unfavourable economics. At present, microalgae are being applied in a limited volume (< 10 000 tonnes dry weight/year) in various niche markets (including food supplements) and macroalgae mass production is facing several challenges including the lack of space to further expand. To reach broader economic viability, costs of algal biomass production need to be reduced and the scale of production needs to be increased significantly. Even when the price of biomass production is reduced, algal biomass needs to be refined into multiple products in order to increase its total value and achieve economic feasibility. An integrated biorefinery concept of macro- or micro-algae and higher value bulk or speciality products can lead to economically feasible and environmentally sustainable processes. Thus, cost reductions in biomass production and harvesting in a sustainable way are essential for the further development and scale-up of the algal bioeconomy sector.

Scope: Proposals should focus on demonstration projects that will scale-up the production and harvesting of integrated marine algae products and bring them nearer to the market in an economically, environmentally and socially sustainable manner. Although the focus is on algae that grow in salt water, fresh water algae may be part of the work as well. The work should build on existing or new marine and maritime technologies. Proposals should address key challenges for scaling up integrated algae production systems, for example higher yielding algae species, optimised operation conditions and energy saving, limited contaminants, recycled nutrients and water, optimal CO_2 use, storage and preservation of harvests before treatment, etc. Proposals should adopt a holistic, life-cycle approach and assess the broader environmental impact, for example from investigating the conditions for the access to sites, up to reducing the impact on the environment and improving education and skills in these sectors. Stakeholder engagement across the value chain, environmental and social acceptance should also be investigated, with the involvement of representatives of the coastal communities concerned.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 11 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In the context of the seas and oceans to optimise algae mass production and secure the sustainable development of integrated bio-refineries, proposals will:

- Develop marine innovation by de-risking investments and demonstrating the technical and economic feasibility of environmentally sustainable large-scale algae biomass production for biorefineries producing a range of value-added products.

- Bring to the market new, cost-effective and environmentally friendly technologies and production systems.
- Increase stakeholder engagement in and societal acceptance of sustainable algal biomass production.
- Enhance the competitiveness of European industry by supporting new jobs, growth and investment while ensuring environmental sustainability and a low environmental impact.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-02-2016/2017: High value-added specialised vessel concepts enabling more efficient servicing of emerging coastal and offshore activities

Specific Challenge: Increasingly business and services are carried out within the marine space. Examples include: offshore terminals, aquaculture, renewable energy, marine biomass, blue tourism, surveying, environmental monitoring, accident response and clean up, and clearing of marine debris and other pollutants. Costs at sea are higher than for equivalent shore based operations and a significant proportion of them are associated with the support vessels which service these activities. Inappropriate vessels can increase costs because they may have limited operational weather windows, high overheads, slow speed, low efficiency and they may be generally ineffective for the task concerned. European yards and their suppliers (often SMEs), are world leaders in high value-added vessels and highly specialised ships. The challenge is to develop novel specialised vessel concepts which are economically viable and environmentally friendly and which will more effectively serve coastal and offshore activities, thereby supporting European growth and employment through development of a blue economy.

Scope: Concepts should be developed to a pre-commercial stage technology readiness level (TRL) 5 and include: model testing, consideration of the most suitable construction and production principles for small series or one off vessels of this type, environmental impact assessment, cost estimation as well as both the marketability (technology push), and the cost effectiveness of the offshore operations concerned (demand pull). Work shall include development and testing of vessel concepts and its equipment so as to reduce costs and enable more efficient operations within either coastal or offshore environments as follows:

1 - Specialised vessels for coastal activities (2016)

2 - Specialised vessels for offshore activities (2017)

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million for "*Specialised vessels for coastal activities*" in 2016 and up to EUR 8 million for "*Specialised vessels for offshore activities*" in 2017 would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: To support significant economic growth and employment within the EU, the project will:

- Develop solutions to at least technology readiness level (TRL) 5 which will significantly impact on the development of a European marine and coastal economy.
- Aim to reduce costs by at least 20% compared to current practices taking the entire process including increased productivity and vessel cost into consideration.
- Increase the professional skills of workers and the capability of European industry and in particular SMEs within the marine and maritime sectors to develop and commercialise specialised vessels and related technology.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-03-2016: Multi-use of the oceans' marine space, offshore and near-shore: compatibility, regulations, environmental and legal issues

Specific Challenge: Combining several activities such as renewable energy, aquaculture, maritime transport and related services in the same marine space, as well as the introduction of multi-use platforms, has the possibility to dividing the infrastructure overhead and reducing the costs of offshore operations, and the demand on the space needed for different activities. One barrier to multi use of the oceans is that different environmental, safety and regulatory regimes and practices apply to different sectors and to different national jurisdictions. Furthermore, there is a lack of common understanding of the nature of operations within different sectors and the feasibility of combining these in a way that provides mutual benefits. The challenge is to identify the real and perceived barriers to integration. There is a need for a clear overview of compatibility, regulatory, environmental, safety, societal and legal issues within the context of the maritime spatial planning directive and how they impact on the combining of different marine and maritime activities.

Scope: The environmental, spatial, economic and societal benefits of co-location of offshore and near-shore activities can be hindered by potentially inappropriate regulatory, operational, environmental, health and safety, societal and legal barriers. An overview of all barriers both real and perceived is required as well as an action plan to overcome these challenges. It is expected that stakeholders (industry, NGOs, governmental organisations, research

organisations and representatives of concerned local communities) are actively engaged in work within this action. Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

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

Expected Impact: In order to reduce costs of offshore and near-shore operations and the marine space needed for different activities, the project will:

- Enable a full understanding of barriers and possibilities associated with combining marine activities.
- Reduce risks associated with the commercial development of combined activities offshore as well as near-shore.
- Concentrate marine activities to enable the more efficient use of the marine space with reduced environmental impact.
- Enhance social acceptance of these new developments by local communities and society-at-large.
- Increase development of European offshore activities that support the Blue Growth agenda.
- Better harmonise regulations.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-04-2017: Multi-use of the oceans marine space, offshore and near-shore: Enabling technologies

Specific Challenge: Combining several activities such as renewable energy, aquaculture, maritime transport and related services in the same marine space, including in multi-use platforms, can serve to divide and reduce the costs of offshore operations and the demand on the space needed for different activities. Research on multi-use platforms funded under the FP7 call 'The Oceans of Tomorrow' has already provided promising designs, technological solutions and models for combining activities in terms of economic potential and environmental impact. However, before reaching a demonstration pilot stage, further technological research and innovations are needed to reduce risks for operators and investors.

Scope: Proposals should develop combinations of innovative, cost-effective technologies and methods including automation and remote monitoring technologies, flexible structures and facilities in order to test concepts of multi-use platforms leading to pilot demonstration phases. They should test the sustainable operability of co-located maritime activities around coastal or deep sea environments. They should also address health and safety issues associated with multi-use marine platforms. Environmental and economic viability as well as societal acceptance should also be investigated, especially by involving local communities. Proposals should capitalise on the results of EU and national projects including those testing business models developed for multi-use platforms for their economic feasibility and environmental sustainability.

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

Expected Impact: To reinforce European competitiveness in the Blue Economy, proposals will:

- Bring technologies and selected designs of multi-use facilities at least to technology readiness level (TRL) 5, ensuring validation of technology in the relevant environment.
- Reduce costs of implementation and increase economic viability of multi-use platforms for the European maritime industry.
- Improve health and safety in multi-use marine platforms.
- Secure acceptance of these new developments by local communities and society-at-large.
- Contribute to the implementation of the Integrated Maritime Strategy and its environmental pillar, the Marine Strategy Framework Directive, and take due account of the Marine Spatial Planning Directive.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-05-2016: ERA-NET Cofund on marine technologies[71]

Specific Challenge: Innovation related to seas and oceans can play a key role in tackling global challenges such as the scarcity and vulnerability of strategic resources and can unlock the potential of a sustainable blue economy, while factoring in environmental and climate change risks. EU intervention is needed to create the conditions for mobilising investments while avoiding the costly duplication of work.

Scope: Proposals should pool the necessary financial resources from the participating national (or regional) research programmes with a view of implementing a joint call for proposals with EU co-funding resulting in grants to third parties. In addition, proposals may involve, publicly-funded research performing organisations that will contribute with their own resources (in-kind contributions). In this case, the joint call should include a separate topic for the participating research performing organisations, so that they will implement the resulting transnational projects themselves. Their participation in the ERA-NET Cofund action must be mandated by the national/regional authorities in charge (usually the responsible ministry). Proposals should address various applications including environmentally friendly, secure and safe waterborne transport, offshore and sub-sea activities, aquaculture, biorefineries, desalination plants, etc. They should focus on overarching challenges such as: reducing underwater noise and emissions, reducing environmental impacts, minimising the carbon footprint, recycling, novel materials, advanced manufacturing technologies, sensors for navigation, observation, monitoring and the deep-sea environment. Proposals should also aim to implement other joint activities, including additional joint calls without EU co-funding, on open maritime and marine topics in line with the Strategic Research and Innovation Agenda and its Implementation Plan under the Joint Programming Initiative "Healthy and Productive Seas and Oceans" (JPI Oceans).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: To contribute to the implementation of the European Blue Growth Agenda and marine and maritime-related Directives, proposals will:

- Bring new knowledge-intensive products and services for marine and maritime activities to the market.
- Increase the resource efficiency, security, safety and environmental compliance of maritime activities.

[71] This activity directly aimed at supporting public-public partnerships with Member States and associated countries, technology platforms with industrial partners and earth observation networks is excluded from the delegation to REA and will be implemented by the Commission services.

- Help implement the European strategy on Key Enabling Technologies (KETs), in particular with regards to advanced materials and manufacturing.
- Support trans-national, pan-European research networks and synergies among national/regional and EU research programmes.
- Facilitate economies of scale and research investment efficiency by better aligning national/regional research programmes, in particular within the Joint Programming Initiative "Healthy and Productive Seas and Oceans".

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LINKING HEALTHY OCEANS AND SEAS FOR HEALTHY PEOPLE

Proposals are invited against the following topic(s):

BG-06-2017: Interaction between people, oceans and seas: a strategic approach towards healthcare and well-being

Specific Challenge: The interaction between people, oceans, seas and coasts is a broad domain with significant impacts on human health and well-being. However, it remains fragmented, poorly understood and underexploited. As coastal populations grow worldwide, not only due to permanent dwellers but also due to increasingly larger number of tourists, the determinants and impacts of this link between oceans and people become more relevant. On the one hand, the seas provide benefits namely through food, feed and positive impacts on overall wellness. On the other hand, the risks associated with the marine environment include chemical and physical pollutants of anthropogenic origin, harmful algal blooms, and countless marine microorganisms that lead to a still poorly assessed proportion of human morbidity and mortality. Therefore, the challenge is to coordinate the existing multidisciplinary research knowledge and resources, including distributed infrastructures, across Europe. This would make it easier to take advantage of the benefits and to better manage the risks of the interaction between oceans and people using an ecosystem-based approach and to formulate evidence-based policies that can benefit citizens as well as achieving good environmental status.

Scope: Proposals should include a plan for the creation of a multi-stakeholder forum that would make it possible to better understand the potential health benefits of marine and coastal ecosystems including in economic terms, anticipate new threats to public health more effectively, identify ways of improving ecosystem services that the marine environment can provide and contribute to reducing the burden of diseases caused by the interplay between

marine-degraded environments and human behaviour. This forum is expected to issue a strategic research agenda based on data covering the biological, cultural and socio-economic dimensions of the interaction between oceans and human health that can ultimately impact morbidity and mortality in the general population. Data should encompass sex and gender differences in the populations studied. Data should be assessed through an active involvement of diverse stakeholders across Europe, including local marine communities, civil society, industry, and public authorities.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: In order to support key EU policies, in particular those directly related to the marine and maritime sectors, such as the EU Blue Growth Agenda, the Blue Tourism Communication and the Marine Strategy Framework Directive, proposals are expected to:

- Create a multi-stakeholder forum that issues a strategic research agenda for oceans and human health, based on new scientific and/or technological evidence and best practices across different geographical locations and climates.
- Highlight novel, cost-effective solutions or interventions that enable effective policy making that aims to maximise health benefits and minimising risks derived from exposure to marine and coastal ecosystems.
- Actively involve local communities across different European maritime regions, comprising civil society, industry, public authorities in data supply, knowledge generation and solution implementation processes.
- Improve global cooperation around oceans and human health.
- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-07-2017: Blue green innovation for clean coasts and seas

Specific Challenge: Debris, chemical and microbial pollution and algae jellyfish blooms are huge and increasing problems in the oceans, seas and coasts. For plastics alone, the economic and ecological cost is considerable when including beach clean-ups, tourism losses, and

damages to the fishing and aquaculture industries. In spite of strong legislation such as EU directives, sea and coastal pollution remains high, and prevention and innovative coast and sea clean-up schemes remain a challenge. Many solutions are available to tackle these sources of pollution, including recycling, waste water treatment, teams of collectors, and specific equipment such as skimmer boats, beach cleaning machines or algae harvesting devices. However, there is a pressing need to develop powerful innovative methods and processes to clean coasts and oceans and to restore the ecosystems to a healthy and clean state. The foremost challenge is not only to remove litter and pollution, but to transform the collected waste into a resource stream in line with the concept of the circular economy.

Scope: The proposals should be for demonstration projects to clean and lay the ground for a healthy ocean or sea and its coasts in any given large geographic area(s), including regional seas or semi-closed sea basins such as the Mediterranean. The demonstration projects should develop and scale-up innovative processes and measures to clean the selected site[72] from visible (for example floating plastics or abandoned fishing gear) and invisible litter (micro-plastics) and pollutants[73], involving local communities and actors. Collected waste materials should be adequately processed so as to enable a subsequent usage/ exploitation/ re-usage. The proposals should apply an ecosystem approach, developing forecasting tools and models to identify areas where the proposed intervention is likely to be most effective in ecological and economic terms. Social acceptance and economic impact of the envisaged measures must also be considered and promoted, for example by disseminating the project results to relevant stakeholders.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals addressing the Mediterranean should contribute to implement the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative).[74]

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

Expected Impact: To contribute to the implementation of EU Policies such as the Marine Strategy Framework Directive and its aim to achieve a good environment status for Europe's seas and oceans by 2020, proposals are expected to:

[72] Each site should be substantial in size and include or be adjacent to different activities.

[73] The exact selection of pollutants and litter will depend on the area selected. However, the choice of the area must be such that several sources of pollution are addressed.

[74] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014. In March 2015, a Strategic Research and Innovation Agenda was developed.

- Develop innovative technological methods or processes for cleaning coasts and seas and transforming waste into a resource.
- Reduce cleaning up/restoration costs through cost-effective solutions, in particular through enhanced resource efficiency.
- Increase awareness and acceptance of civil society about the importance of healthy oceans and seas, devoid of litter and pollutants, in civil society.
- Progress towards reducing pollution and debris (macro, micro and nano) in regional sea basins and beyond, and towards restoring marine ecosystems.
- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-08-2017: Innovative sustainable solutions for improving the safety and dietary properties of seafood

Specific Challenge: The seafood [75] production and processing industry contributes substantially to food security, employment and trade in regions where the activity takes place. To safeguard and strengthen this and make the activity more sustainable, seafood production should be market-driven and consumer-responsive, addressing challenges such as increasing consumer awareness of food quality and safety traceability and animal welfare. Ensuring the sustainability of the seafood processing industry involves not only innovative technologies that could mitigate environmental damage but also securing its economic viability and taking account of the consumer imperatives behind them. One way of ensuring the sustainable production and processing of nutritious and safe seafood products is through the demonstration and first application in the market of eco-innovative, sustainable processing solutions of marine and aquaculture-derived food products and nutrients.

Scope: Proposals should build on state-of-the-art research insights from EU and other funded projects in this field, with a specific focus on food safety (from harvesting to the final products). They should aim to generate new knowledge to develop commercial solutions for improving the socio-economic and environmental sustainability of the seafood production and processing industry, while also contributing to product quality and safety. Activities should directly aim to produce plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, and large-scale product validation, all with a view to paving the way

[75] 'Seafood' comprises marine and fresh water biological resources (as defined in the Common Fisheries Policy) from both fisheries and aquaculture.

for subsequent market replication and uptake by consumers. Proposals may take into account impacts across different locations and population segments, as well as the specificities of different types of seafood, also in terms of nutrition. Work is expected to benefit from the contribution of social sciences wherever applicable. Where relevant, proposals should address gender-specific aspects, and the gender dimension in the research content shall be taken into account[76]. Aspects of traceability, authentication and certification of EU seafood products and labels of quality should be conveniently addressed. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To contribute to EU food safety common standards and legislation for seafood products and nutrients, proposals are expected to:

- Ensure that eco-innovative solutions for the sustainable production and processing of marine and aquaculture-derived food products and nutrients are used more widely, as a result of greater user acceptance, higher visibility of innovative solutions and the creation of scalable markets.
- Improve the competitiveness of the EU seafood sector, and increase opportunities for growth, diversification and job creation for the sector in general and SMEs in particular.
- Benefit consumers by allowing them to make better-informed seafood choices.
- Increase the availability of healthier seafood, which will improve consumers' diet and health.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

THE ARCTIC DIMENSION

[76] See definition of the 'gender approach' in the introduction of this Work Programme part (see text box).

Proposals are invited against the following topic(s):

BG-09-2016: An integrated Arctic observation system

Specific Challenge: The Arctic is a theatre of profound transformation. Climate change is significantly affecting the extent and thickness of sea-ice, on snow cover 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 observation system is becoming essential for studying, forecasting and assessing changes that support the region's sustainable development. Improving and coordinating current capabilities for assessing and predicting Arctic environmental change requires the provision of data on a number of key variables of Arctic meteorology, climatology, oceanography, ecosystems and pollution at various scales. Monitoring and improved understanding of the Arctic climate system and its teleconnections, as well as of ecosystem change and the socio-economic impacts on offshore operations, new shipping routes, mining activities, tourism etc. are important prerequisites for effectively assessing climate change adaptation and mitigation strategies in the Arctic and elsewhere.

Scope: An integrated Arctic observation system should close critical gaps with innovative solutions, as well as improve the integration and inter-operability of existing observation systems, also in view of data assimilation into models. The activity shall be based on co-operation between the existing European and international infrastructures (in-situ and remote including space-based) and the modelling communities, with the active participation of relevant stakeholder groups. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), the action should 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). It should have links to the relevant Copernicus and European Space Agency (ESA) programmes and infrastructure in order to maximise the synergies other European efforts to develop an integrated Arctic observation system. In particular, strong coordination with the on-going Horizon 2020 project which aims to develop an Integrated Atlantic Ocean Observation System [77] should be sought and with the relevant ESFRI research infrastructures. The activity shall support and promote the integrated use of Arctic land, ocean, ice and atmosphere *in-situ* and space-based observations from Europe, the USA, Canada and other international partners. Community-based observation programmes that draw on indigenous and local knowledge should be included and should 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, following the GEO data sharing principles. It should make best use of reference sites (supersites) and should contribute to filling *in-situ* observational gaps through novel technology development,

[77] AlantOS,www.atlantos-h2020.eu/

with particular attention to the gaps that may help improve the accuracy of predictive models. In line with the strategy for EU international cooperation in research and innovation[78], 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 should benefit from the inclusion of partners from the USA and from Canada[79]. 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 of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction[80].

Expected Impact:

- Increase temporal and geographic coverage and usefulness of observational data in the Arctic with a view to improving the assessment and prediction capacity of Arctic and planetary changes;
- Support standardisation and calibration/validation activities, and improve the inter-operability of Arctic observational data;
- Improve the sustained integration of space-based and *in-situ* Arctic observations into process models and forecast systems showing benefit to the Copernicus monitoring services;
- Contribute to the 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;
- Improve the cost-effectiveness 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. local communities, shipping, tourism, fishing);

[78] (COM(2012)497)

[79] Please note that participants from developed countries are not eligible for Horizon 2020 funding.

[80] Beneficiaries of projects participating in the pilot on open research data are should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and to register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found from: http://www.earthobservations.org.

- Support international assessments of global challenges such as climate change, scarcity of natural resources and global scale hazards;
- Strengthen the societal and economic role of the Arctic region and support the EU strategy for the Arctic and related maritime and environmental policies[81];
- Contribute to the GEO Cold Region Initiative and to the Transatlantic Ocean Research Alliance;
- Contribute to the ongoing and possible future OSPAR actions in Arctic waters;
- Contribute to the Sustaining Arctic Observation Networks (SAON) process;
- Contribute to the WMO Programme Year of Polar Prediction (YOPP)[82].
- Improve the professional skills and competences for those working and being trained to work within this subject area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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

Specific Challenge: The climate is changing more rapidly in the Arctic than in any other region. There is evidence that these changes strongly affect ecosystems, people and communities inside and outside of the Arctic, including in Europe and North America. A better representation of processes specific to 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 and in the generation of extreme weather events. In connection with improved observations in the Arctic (see topic BG-09), this is necessary to improve the predictability of weather and climate in the Northern Hemisphere, and of related risks.

Scope: Proposals should develop innovative approaches to improving the descriptions and modelling of the mechanisms, processes and feedback affecting Arctic climate change and its impacts on the weather and climate of the Northern Hemisphere, to further develop state-of-the-art climate models and predictions. Model performance should be assessed, and their ability to represent the links between polar and lower latitudes should be evaluated through coordinated model experiments. Actions should also explore the potential that an improved Arctic observation system – the subject of another topic in this call – would have on the accuracy of weather, and climate forecasts in the Northern Hemisphere, including Europe and

[81] COM(2008) 763 of 20 November 2008; JOIN(2012) 19 of 26 June 2012

[82] http://www.polarprediction.net/yopp.html

North America, and also should identify gaps in data and observations. The activities should contribute to the programme of the Year of Polar Prediction (YOPP)[83] and provide input to the improvement of short- to medium-term predictions of the Copernicus Climate Change Services (C3S)[84]. 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 should build on projects funded under earlier calls. Links with projects resulting from the Belmont Forum call on climate predictability[85] are also welcome. Proposals should develop relevant forms of communication with the EU (and possibly national) services to adequately disseminate results that could be used for policy action. In line with the strategy for EU international cooperation in research and innovation [86] , actions should 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 should benefit from the inclusion of partners from the USA and from Canada[87]. 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 7 million and EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction[88].

Expected Impact: The project results are expected to:

- Improve capacity to predict the weather and climate of the Northern Hemisphere, and make it possible to better forecast of extreme weather phenomena;
- Improve the capacity to respond 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;

83 http://www.polarprediction.net/yopp.html.
84 http://www.copernicus-climate.eu/.
85 http://www.jpi-climate.eu/joint-actions/CPIL.
86 (COM(2012)497)
87 Please note that participants from developed countries are not eligible for Horizon 2020 funding.
88 Beneficiaries of projects participating in the pilot on open research data should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found at http://www.earthobservations.org.

- Improve the uptake of measurements from satellites by making use of new Earth observation assets;
- Lead to optimised observation systems for various modelling applications;
- 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;
- Improve stakeholders' capacity to adapt to climate change;
- Contribute to better servicing the economic sectors that 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.
- Improve the professional skills and competences for those working and being trained to work within this subject area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-11-2017: The effect of climate change on Arctic permafrost and its socio-economic impact, with a focus on coastal areas

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 to greenhouse gases, reinforcing global warming (permafrost carbon feedback). Moreover, permafrost coasts make up 34% of the world's coasts. Increasing sea-level in combination with changing sea-ice cover and permafrost thawing expose these coastal areas to higher risks. Knowledge gaps exist in relation to the transfer of material - including organic matter - from land to sea and its fate, with the consequence that processes of accumulation and/or subsea permafrost degradation are not accounted for in global climate and Earth system models. The pressing challenge is to understand the impact of permafrost thawing on climate change and its implications for the environment, for the indigenous populations and the local communities. Finally, permafrost thawing affects the stability of built infrastructure.

Scope: Actions should assess the impact of permafrost thawing on Arctic (natural and human) coastal systems and its effect on the availability/accessibility of resources, the stability of infrastructure, the growth of potential new economic activities, as well as on pollution and health. The research should employ a holistic and trans-disciplinary approach and in co-operation with stakeholders. It should consider the needs of and the impacts on indigenous

populations, local communities and economic actors operating in this vulnerable region in the sustainable development context. 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.

Proposals should develop relevant forms of communication for EU (and possible national) services to adequately disseminate 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[89], 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 should benefit from the inclusion of partners from the USA and from Canada[90]. 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 up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction[91].

Expected Impact:

- Improve the capacity to predict the impacts of permafrost thawing, both sub-sea and on land, identify and reduce uncertainties, and quantify key processes not currently or poorly represented in predictive models;
- Develop capacity to manage risks and to take advantage of opportunities emerging from Arctic changes;
- Promote the engagement of and interaction with residents of Arctic coastal communities and indigenous societies and develop a legacy of collaborative community involvement with scientific, economic, and societal actors and stakeholders on the development of Responsible Research and Innovation agendas that meet their concerns and expectations.
- Contribute to the ongoing and possible future OSPAR actions in Arctic water

[89] (COM(2012)497)

[90] Please note that participants from developed countries are not eligible for Horizon 2020 funding.

[91] Beneficiaries of projects participating in the pilot on open research data should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found at http://www.earthobservations.org.

- Improve the professional skills and competences for those working and being trained to work within this subject area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

VALORISING THE MEDITERRANEAN SEA BASIN

Proposals are invited against the following topic(s):

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 that we understand and are able to forecast 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 supporting the development of solutions to solve the above mentioned issues through several policies and international agreements such as the EU Integrated Maritime Policy (IMP), the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy (CFP), the EU neighbourhood policy, the Barcelona convention and more recently the EU BLUEMED Initiative[92]. One of the main goals of the latter is to create an interoperable, fully integrated multiplatform observing and forecasting capacity to support the conservation of biodiversity, and to forecast and manage risks and emergencies at the coast and at sea. The implementation of these policies and conventions requires a strong knowledge base and predictive capacities that are derived from Earth observation data. These observation data are, however, still very fragmented, or are even lacking for certain areas of the Mediterranean Sea, in particular in the southern part. They are also still difficult to access, partly because of the many initiatives and systems that exist. The challenge here is to conduct the research and innovation activities that are necessary for the integration of the existing Earth observation facilities and networks in

[92] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims is to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio-economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

the Mediterranean Sea building on relevant initiatives such as Copernicus[93], GEOSS[94], GOOS[95], EMODNet[96], ESFRI[97] and in particular all those with strong links to marine and maritime issues, and national initiatives. This would fill out the existing observational gaps, and would help 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, and addressing both the open sea and the coastal zone. This should be based on open data and should facilitate easy access to those facilities and the data. Another focus should be on conducting the research and innovation necessary to underpin the full and open discovery and access to the ocean observations and to facilitate the interoperable exchange of ocean observation as promoted through the Group on Earth Observation (GEO) for 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. Optimising existing systems and using new ocean observation technologies make *in-situ* ocean observation and the integration of the biological dimension into observing systems more cost-effective. The proposals should also focus 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 that support the improvement and evolution of operational services in the Mediterranean Sea. The above activities should include the participation of international partners from the coastal states of the Mediterranean Sea.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals should contribute to implementing the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)[98].

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93 www.copernicus.eu. The Copernicus data and products, where available, should be used by the research and innovation community following the free, full and open access approach approved in the Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013. This includes the data from the Copernicus space infrastructure (Sentinel missions) and, where affordable, the Copernicus Contribution mission data, where the latter can be of use for Horizon 2020 projects developing new Copernicus Services. Applicants are advised to consult published information on the availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data at the Commission's web http://ec.europa.eu/growth/sectors/space/research/index_en.htm. Wherever possible, applicants are also encouraged to use the Earth Observation Data Warehouse (http://copernicusdata.esa.int/web/cscda/home).

94 GEOSS – Global Earth Observation System of Systems

95 GOOS – Global Ocean Observing System

96 EMODNet – European Marine Data Observation Network

97 ESFRI – European Strategy on Research Infrastructures

98 The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to develop a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To contribute to the implementation of the BLUEMED Initiative's vision and its related Strategic Research and Innovation Agenda and Implementation Plan, in particular as regards the goal to develop an integrated Mediterranean observing system, proposals must:

- Provide an additional European contribution to established global observing systems e.g. Copernicus and GEOSS. Provide a Mediterranean Sea Integrated Observing system as a component for GEOSS.
- Contribute to increasing the temporal and geographic coverage of observational data in the Mediterranean Sea and identify observational gaps.
- Provide qualified data to improve the predictive capacity of model products and improve the cost effectiveness of data collection in support of ocean-related industrial and societal activities.
- Improve the knowledge base that is needed in order to cope with global challenges such as climate change, scarcity of natural resources and regional hazards; this would make it possible to make better-informed decisions within key sectors, and increase the safety of offshore activities and coastal communities.
- Improve the implementation of European maritime and environmental policies and international agreements (e.g. Marine Strategy Framework Directive, INSPIRE Directive[99] , Common Fisheries Policy, EU Integrated Maritime Policy, the Barcelona convention) by providing the knowledge base needed to support policy decisions towards the sustainable growth of the EU Mediterranean marine and maritime economy.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

boost socio-economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and was presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

[99] INSPIRE-Infrastructure for Spatial Information in the European Community

BG-13-2016: Support to the BLUEMED Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean [100]

Specific Challenge: The Mediterranean Sea is going through rapid changes in response to closely interlinked natural and anthropogenic pressures. Climate change influences its physical dynamics and hydrological structure, while nutrient and pollutant loads are flowing from growing urban areas, land and coastal activities. Increasing maritime traffic also leads to safety concerns, potential pollution and the introduction of invasive alien species. Fishing remains unsustainable. The area's marine heritage and its ecosystem services are also at risk. In addition, the geo-political complexity of the area adds further difficulties related to the establishment of favourable framework conditions to support the growth of a blue economy (e.g. in trans-border cooperation on sea-related activities, including maritime spatial planning). Within this frame, coordinated and integrated action needs to be carried out by Member States individually and among Member States together in order to create synergies and complementarities between sectors and countries. This is to provide added value to regional, national and EU investments, remove barriers, avoid duplication and reduce fragmentation, and was put forward in the Vision Statement of the 'Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area – The BLUEMED Initiative'[101]. This initiative and its related Strategic Research and Innovation Agenda will contribute to achieving a healthier, more productive, resilient, better known and valued Mediterranean Sea. In addition, a common marine and maritime R&I strategy needs to be further consolidated in order for it to be possible to achieve solid knowledge-based sustainable and long lasting 'Blue Growth' in the region[102].

Scope: This action is expected to contribute to the implementation of 'The BLUEMED Initiative' vision with its related Strategic Research and Innovation Agenda and Implementation Plan. This calls for the further alignment and convergence of national research and innovation activities and other relevant initiatives and investments with the different actors and across different sectors *in primis* between the European countries bordering the Mediterranean Sea coasts and the whole EU. In this context, proposals should establish and consolidate an operational network of marine and maritime research funders and other key players. Proposals should support the design and implementation of new transnational joint activities, by using the most suitable and effective collaboration methods and tools. These new activities should focus on the key challenges and other relevant issues

[100] This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to REA and will be implemented by the Commission services.

[101] https://www.researchitaly.it/uploads/12471/BLUEMED_SRIA_March2015.pdf?v=7fb440d

[102] The "Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and was presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.

identified in the BLUEMED Strategic Research and Innovation Agenda (SRIA) and related Implementation Plan, namely support for technology development, promotion of multidisciplinary research and an innovation-enabling environment, improving human and research infrastructures and capacities, creating a fully integrated observing and forecasting system, promoting citizen awareness and literacy on marine issues, and improving training. This action should build on past and ongoing regional, national and EU projects (e.g. SEASera ERA-NET, PERSEUS COCONET, ESFRI research infrastructures EMBRC, Euro-Argo, ICOS, EMSO etc.) and initiatives. It should integrate research, policy, industry (including aquaculture) and society (including the preservation of local coastal cultures). It should also contribute to pooling different funding streams, at national and EU level, and combine them in an effective way. Lastly, it should create the conditions for extending the initiative to the Southern Mediterranean coastal countries. Support for related events organised under the auspices of the Presidency of the Council of the European Union should be envisaged.

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

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact: To contribute to the implementation of the BLUEMED Initiative's vision, its related Strategic Research and Innovation Agenda and Implementation Plan, proposals must:

- Make the Mediterranean Sea healthier, more productive, resilient, better known and valued.
- Boost the knowledge base and contribute to creating the right conditions for developing new technologies and services and for improving human and infrastructure capacity in the Mediterranean region.
- Boost the 'blue economy' and contribute to creating more jobs in the Mediterranean region.
- Increase the competitiveness of EU researchers, industry and SMEs within the marine and maritime sectors.
- Improve the coordination and alignment of national marine and maritime research programmes.
- Maximise the impact of national and EU-funded marine and maritime research.

- Contribute to the implementation of the EU Integrated Maritime Policy, its environmental pillar the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy (CFP) and the Communication 'Blue Growth - opportunities for marine and maritime sustainable growth'.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Blue Growth - Demonstrating an ocean of opportunities

Opening date(s), deadline(s), indicative budget(s):[103]

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 27 Oct 2015			
BG-01-2016 (IA)	22.00		17 Feb 2016
BG-02-2016/2017 (IA)	7.00 [104]		
BG-03-2016 (CSA)	2.00 [105]		
BG-05-2016 (ERA-NET-Cofund)	10.00 [106]		
BG-09-2016 (RIA) BG-10-2016 (RIA)	30.00 [107]		
BG-13-2016 (CSA)	3.00		
BG-12-2016 (RIA)	8.00		17 Feb 2016 (First stage) 13 Sep 2016 (Second stage)

[103] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
All deadlines are at 17.00.00 Brussels local time.
The Director-General responsible may delay the deadline(s) by up to two months.
The deadline(s) in 2017 are indicative and subject to a separate financing decision for 2017.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

[104] of which EUR 7.00 million from 'Smart, green and integrated transport'.

[105] of which EUR 2.00 million from "Secure, Clean and Efficient Energy".

[106] of which EUR 2.00 million from 'Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing', EUR 2.00 million from 'Smart, green and integrated transport'.

[107] of which EUR 30.00 million from 'Climate action, environment, resource efficiency and raw materials'.

Opening: 04 Oct 2016			
BG-02-2016/2017 (IA)		8.00 [108]	14 Feb 2017
BG-04-2017 (IA)		8.00	
BG-06-2017 (CSA)		2.00	
BG-07-2017 (IA)		12.00	
BG-08-2017 (IA)		7.00	
BG-11-2017 (RIA)		10.00 [109]	
Overall indicative budget	82.00	47.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

[108] of which EUR 8.00 million from 'Smart, green and integrated transport'.

[109] of which EUR 10.00 million from 'Climate action, environment, resource efficiency and raw materials'.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide published on the Participant Portal.

Consortium agreement: Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

Call - Rural Renaissance - Fostering innovation and business opportunities

H2020-RUR-2016-2017

INTRODUCTION

Rural areas are Europe's primary source of food and reservoir of natural resources. They play a major role in managing and ensuring sustainable use of these resources and the delivery of food, public goods and ecosystem services providing long-term benefits society as a whole. At the same time they are affected by a range of demographic, economic and societal developments such as urbanisation, depopulation, business relocation and population ageing. The call will support a 'rural renaissance' by raising the natural, social, cultural and economic potential of rural areas and fostering policy coherence. It will aim to boost economic development, environmental services and entrepreneurial innovation, in particular in SMEs, in rural and coastal areas. This will be achieved by building on diversification and modernisation strategies and capitalising on local assets, including human, natural and cultural capital.

The call is structured around three main areas:

- new approaches towards policies and governance: activities will be aimed at improving policies and governance at various geographic scales to foster sustainable growth in rural areas. They will cover aspects such as territorial linkages and coherent policy approaches for the management and use of natural resources and for the provision of ecosystem services and public goods;

- new value chains and business models: to foster sustainable growth in rural areas, new services, products and value chains will be developed that take advantage of technological and non-technological innovations and the scope for greater cross-sectoral synergies will be explored; and

- innovation and skills development: activities directed at knowledge and innovation systems, education and training, advisory services and entrepreneurial skills will enhance rural communities' capacity to mobilise new knowledge and technologies for the development of their activities. In addition, activities will aim to foster the delivery of policies impacting innovation and will contribute to the implementation of the European Innovation Partnership 'Agricultural Productivity and Sustainability'.

In particular, action in this area will contribute to the objectives of European structural and investment funds, including rural development under the common agricultural policy, the Innovation Union, recent developments on rural-urban partnerships and energy and climate policies.

Synergies and/or complementarities across projects selected for funding within Societal Challenge 2 are encouraged, e.g. between those in the Blue Growth Focus Area and in the Rural Renaissance call (for example between 'new approaches towards policies and governance', e.g.'RUR-2-2017: Coastal-rural interactions: enhancing synergies between land and sea-based activities'), and 'healthy oceans and seas for healthy people', e.g. 'BG-8-2017: Innovative sustainable solutions for improving the safety and dietary properties of seafood').

NEW APPROACHES TOWARDS POLICIES AND GOVERNANCE

Proposals are invited against the following topic(s):

RUR-01-2016: Consolidated policy framework and governance models for synergies in rural-urban linkages

Specific Challenge: Increasing urbanisation and the transformation of rural economies and communities result in new types of rural-urban interaction and dependency, to which policies and governance approaches still have to fully adapt. Consolidated evidence is needed to assess the impact of such interaction on rural growth potential (in which there is an increasing interest worldwide) and understand, in concrete and operational terms, how linkages and dependencies between urban and rural activities affect the creation of added value and jobs. Recent studies have provided some evidence that well-functioning relationships between urban and rural areas can lead to higher growth rates in both. They may also deliver more sustainable, integrated and inclusive forms of development, building on local assets and natural resources to improve adaptation and resilience to global change. There is a need for thorough understanding and a consolidated conceptual framework is needed to tailor policy intervention at different scales so as to maximise rural job and growth creation on the basis of synergistic interaction.

Scope: Building on the EU typology of urban and rural areas[110] and on the outcomes of previous studies on rural-urban linkages, proposals should consolidate a conceptual and policy framework adapted to the diversity of European needs, including a well-argued approach to defining functional areas. They should analyse how European rural areas interact with other (in particular, urban) areas in their region or beyond, exploring endogenous conditions that enable them to interact and quantifying the importance of these connections for the rural economy and society. Activities should involve case studies covering a diverse set of territorial contexts and scales of analysis describing practical linkages between rural and urban activities, mutual dependencies, competitive or synergistic relationships, the distribution of value-adding production steps between rural and urban areas and the institutional and policy context. Proposals should involve participatory research identifying

[110] http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology;http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology_update

concrete opportunities for greater synergies and cooperation between urban and rural activities and communities, bottlenecks impeding synergistic development and concrete solutions to remove these bottlenecks. Activities should assess the effectiveness of a variety of existing or emerging governance approaches and instruments, including those provided by the European structural and investment funds, looking at official authorities but also at informal governance groups (e.g. local action groups). Concrete outputs could be a set of governance models and tools adapted to different types of situation. Such models should cater for better economic development as well as for modernisation of service delivery.

Activities should look at economic, environmental and social linkages and dependencies in an integrated way and examine various territorial settings, covering various forms of territorial interaction beyond city-hinterland relationships, including networks of small market towns and other types of more distant, cross-border or international interaction.

Projects should fall under the concept of the 'multi-actor approach'[111], involving local development or economic development bodies in rural and urban areas or representatives of both rural and urban economic players. Activities should involve engagement with government bodies at the appropriate scale, and with businesses and society. Targeted communication activities and easy-to-use policy-oriented outputs and training material will ensure maximum uptake of the results during the lifetime of the project and beyond. Networking activities between case-study areas and other areas interested in rural-urban synergies and leading to longer-term cooperation may be envisaged. Some cooperation activities with projects financed under topic RUR-2-2017 could be included.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 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: Results are expected to improve policies for the management of rural-urban linkages through:

- consolidation of a policy-oriented conceptual framework allowing the quantitative and qualitative description of a wide range of economic, environmental and social interactions and the definition of functional areas;
- improved understanding of functional rural-urban linkages and how these translate into varying development patterns, helping to explain growth and employment performance and sustainability;
- identification of opportunities for greater cross-sectoral cooperation and synergies; and
- provision of:

[111] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- a set of successful and transferable governance models applicable to different types of situation and rural settings;
- appropriate policy recommendations to enhance the development of these governance models at various scales; and
- communication and training material to facilitate dissemination of projects outcomes and foster their uptake by a significant number of relevant authorities across Europe.

Better managed urban-rural relationships, improved governance and increased cross-sectoral cooperation will enable further growth and job creation in rural areas in the long term.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-02-2017: Coastal-rural interactions: Enhancing synergies between land and sea-based activities

Specific Challenge: At the interface of land and sea, coastal areas are environmentally fragile but also attractive areas with unexploited business opportunities. Land-based activities in coastal regions and even beyond, in upstream river-basins, influence the availability and quality of fresh water reaching the sea and, as a consequence, coastal and sea-based economic activities (including tourism) and the exploitation of marine resources. Equally, coastal development can have positive or negative effects on hinterland development, e.g. tourism-related pressure on land availability. Mainstream agro-environmental policies tend to fail when it comes to lowering nutrient load on the shorelines while rural economies do not always benefit from the economic development on the coast. There is a need to explore how territorial governance approaches and cross-sectoral economic development approaches could deliver mutually beneficial impacts for rural territories and coastal areas and seas which cannot be achieved in other ways, in particular as regards mitigating the impact of land-based activities on coastal water quality.

Scope: Combining environmental, agricultural and socio-economic research, proposals will identify and analyse interactions between land (coast and hinterland) and sea, identify the various components of local economies at the interface of land and sea and analyse their respective importance and short, medium and long-term development trends taking into account market, environmental and climate forecasts. The analysis should provide an inventory of the positive and negative externalities of different activities, including the effect they have on each other, and consider whether solutions exist to mitigate negative externalities and enhance positive externalities, listing motivations and barriers to change for the types of player involved. The analysis should highlight potential cross-sectoral

interactions and innovation that could emerge from greater cooperation between sea-based and land-based businesses or organisations.

The analysis should cover a representative set of coastal areas or regions across Europe varying according to size and geographical, environmental, socio-economic, institutional and administrative conditions (regional, inter-regional, macro-region, cross-border). Interactive research approaches should be used to engage with local businesses and citizens and elaborate options for cooperation, networking and integrated governance seeking to enhance partnership. Activities could usefully build on a review of positive (and perhaps negative) examples from different areas, including innovative business models integrating land-based and sea-based production with simultaneous benefit for the local economy, local jobs and the environment both on the coast and in the hinterland. Proposals could seek to create long-lasting relationships within and between the case study areas benchmarked by the project in order to generate knowledge exchange.

Concrete outputs would include a set of tools which could be used to foster synergistic relationships in different coastal areas of Europe, and concrete and operational governance models to be applied. The potential use of instruments provided by the European Structural and Investment funds for the period 2014-2020 should be explored. Communication and dissemination activities should be carefully targeted and planned to reach out to all potentially interested areas beyond those participating in the consortium. Training material and coaching activities may be envisaged. Some cooperation activities with projects financed under topic RUR-1-2016 could be included.

Proposals should fall under the concept of the 'multi-actor approach'[112] and involve farmers groups and other land and sea-based businesses, and economic and local development bodies. Engaging with managing authorities of European structural and investment funds during the project would help increase implementation of the project outcomes.

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

Expected Impact: Results are expected to contribute to the long-term improvement of sea water quality combined with the creation of added value and jobs in coastal areas and hinterland through:

- development of a transferable set of tools and indicators allowing the quantitative and qualitative description of a wide variety of economic, environmental and social land-sea interactions, thus improving understanding of economic and social interactions in coastal areas, serving a more evidence-based policy-making at local and regional level;

[112] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

- a thorough understanding of the factors (barriers and motivators) influencing behaviour and solutions to enable joint actions;
- increased potential for job and added-value creation in coastal areas thanks to the identification of new business opportunities stemming from closer cooperation between land- and sea-based economic operators; and
- reduced negative externalities from land-based activities in the regional hinterland on sea-based activities thanks to better economic cooperation and integrated governance.

The project may lead to the creation of longer-term relationships between coastal areas serving as European flagships for rural-coastal synergies and ensuring longer and wider dissemination.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-03-2017: Towards 2030 - policies and decision tools for an integrated management of natural resources

Specific Challenge: Policies influencing the management and use of natural resources at national and EU levels have evolved considerably in the past decades as underpinning objectives have widened to meet societal needs (food security, environment, energy, climate change, etc.). However, this process has been fragmented and incomplete. In addition the technology and information available to decision-makers have advanced significantly in this time. To ensure sustainable management of natural resources in the long term there is a need for an integrated framework that addresses all society's objectives appropriately by incentivising actions / behaviours / investments contributing to desirable targets. Appropriate decision-support tools are needed to help implement such an integrated and systemic approach.

Scope: Activities will take place on various geographic scales reflecting levels of policy / use relevance, from regional to EU levels. Investigations relating to both policy and decision tools will be fully participatory so as to ensure the involvement of the society at large. Policy development will take account of all current and expected major societal needs as regards natural resources and their use in terms of products and other types of goods, services and functions. Decision-support tools and models will help prioritise multiple resource uses (e.g. land, water) at various geographic scales (meso level and related regional strategies + national/EU level for general policies), taking advantage of existing databases and tools and what is possible on the basis of modern capabilities. Activities will cover agricultural and forestry land. While focusing on Europe, proposals are encouraged to draw on good examples from elsewhere.

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

Expected Impact: The project results are expected to:

- improve knowledge of land and water resource availability and use at various geographic scales;
- improve decision support tools for the management of land and water resources; and
- provide a coherent and integrated policy framework for the management of natural resources at regional / national / EU levels.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-04-2016: Water farms – improving farming and its impact on the supply of drinking water

Specific Challenge: Agriculture is the biggest source of pesticides and nitrate pollution in European fresh waters[113]. The quality of drinking water, which matters a lot to EU citizens, and the level and cost of treatment prior to consumption depend greatly on the quality of the ground-water and surface-water used to produce it. This is partly why the Water Framework Directive (WFD), linked to the Drinking Water Directive, puts such emphasis on the protection of ground-water and surface-water resources[114]. The diffuse pollution of water sources from the pesticides and fertilisers used in farming systems has been addressed with varying degrees of success by current policy tools but clearly remains an obstacle to achieving the WFD objectives. Monitoring such pollution is also challenging because of the high number of registered pesticides, the cost of analyses and the need for samples to be taken during periods of application and use, and in various weather conditions. Additionally, the time dynamics of water resource systems entail a delay between action at the soil surface and reaction in the ground-water. Appropriate monitoring and decision-support tools are needed to help develop and implement governance models to preserve the quality of drinking water resources.

Scope: Proposals will entail a variety of case studies identifying good practices in the field of drinking-water management involving improved farming systems and land-use management; these will cover a variety of pedo-climatic conditions, vulnerable zones with different types of

[113] http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_pesticide_pollution_of_water& Agri-environmental_indicator_-_nitrate_pollution_of_water

[114] http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

farming systems, contrasting legal frameworks, larger and smaller water collection areas, including rural and urban areas and only rural areas with a focus on small water supplies, which face the biggest problems in the EU and globally. The effectiveness of various measures in mitigating diffuse agricultural pollution will be analysed. Work will include cost-efficiency analysis of mitigation measures and cost-benefit analysis for the society and the actors concerned of identified preventive and curative options for the delivery of high-quality drinking water. Transition pathways from "paying for depolluting" to "rewarding farming systems delivering water quality" options shall be investigated, taking into account various temporal and spatial scaling issues. Governance models, including private spring-water companies and public water-supply bodies, will be investigated. The project will deliver improved public policy instruments and decision support for the various alternatives, including monitoring and control tools, taking into account the necessary cooperation and regional partnerships. Proposals will develop harmonised, transparent and understandable indicators to ensure reliable and comparable data in order to involve farmers and citizens. Proposals should fall under the concept of the 'multi-actor approach'[115].

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

Expected Impact:

- good cooperation between stakeholders on pesticides, fertilisers and irrigation management practices capable of reducing point source and diffuse pollution in different contexts;
- harmonised datasets on pesticide and fertiliser contamination of the drinking-water resources;
- greater involvement of farmers and other citizens in the monitoring of water quality;
- water governance models that are more conductive to the adoption and long-term durability of efficient on-farm and land-use strategies; and
- integrated scientific support for relevant EU policies (e.g. Common Agricultural Policy, Water Framework Directive, sustainable use of pesticides).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[115] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

RUR-05-2017: Novel public policies, business models and mechanisms for the sustainable supply of and payment for forest ecosystem services

Specific Challenge: Regional differences with respect to the forest management systems implemented and long production cycles characterise the forestry sector in the EU. Forests generally provide for a range of goods and services, some valued by existing markets (i.e. wood and non-wood products), others not. Of the latter, some are "public goods" (i.e. they are non-excludable (everyone benefits from them) and are not subject to consumption rivalry), such as carbon sequestration and landscape, while others are "common-pool resources" (i.e. they are non-excludable goods but subject to competition in use), such as recreation or water supply. The regulatory framework is divided into forest polices and forest-related policies (e.g. rural development, climate, biodiversity, and energy) which are not necessarily mutually reinforcing. The responsibility for forest policies ranges from EU level (monitoring, protection, land use, land use change and forestry (LULUCF) reporting, etc.) to Member State or federal state level (inventory, planning, management, etc.). If the policy or market fails – a recognised threat – the undesired outcome is suboptimal provision of ecosystem services. The sustainable provision of ecosystem services therefore requires policy coordination, and the use of novel policies, business models and mechanisms, while taking into account the production of wood and non-wood forest products. Several EU Member States, with the help of the European Commission, are currently mapping and assessing the state of forest (and other) ecosystems and their services in their respective national territories as part of the 'Mapping and Assessment of Ecosystems and their Services (MAES) exercise. There is now significant scope to capitalise on these efforts and for greater implementation of the knowledge they have generated in practice.

Scope: Proposals should aim to develop novel public policies, business models and mechanisms to "internalise" the proven socio-economic value of forest ecosystem services ("externalities") and contribute to their sustainable supply, with proper consideration given to the multifunctional role of EU forests. Proposals should consider the holistic basket of economic, socio-cultural, recreational and environmental services, from both the supply and demand side, and the trade-offs between them. They should aim to close the gap between academic work, associated policy recommendations, and practice on the ground, and help achieve public acceptability. The role of active forest management, which incurs reduced income and/or higher investment, needs to be emphasised. Specifically, there is a need to develop mechanisms for the payment of ecosystem services at the appropriate level of forest management and administration. The pilot testing of the proposed mechanisms, which may combine public policy tools with business models, is encouraged. Proposals should include contributions from the social sciences and humanities, fall under the concept of the "multi-actor approach"[116] and seek public engagement with regard to the groups of stakeholders included in the consortia and the proposed business models/mechanisms.

[116] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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

Expected Impact: Proposals should show how some, or all, of the following impacts will be achieved:

- Enhanced coordination in policy making together with the development of novel policies and business processes, translated into increased incentives for forest owners/administrators to sustainably supply essential ecosystem services, such as carbon sequestration, biodiversity conservation, water regulation, soil and nutrient regulation, landscape and recreation, while maintaining production of wood and non-wood forest products.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NEW VALUE CHAINS AND BUSINESS MODELS

Proposals are invited against the following topic(s):

RUR-06-2016: Crop diversification systems for the delivery of food, feed, industrial products and ecosystems services - from farm benefits to value-chain organisation

Specific Challenge: The temporal and spatial diversification of crops through rotation and associations allowing low-input agronomic practices are drivers for resource-efficient farming systems that can fulfil the need simultaneously to produce food, feed, industrial products (e.g. bioenergy, biomaterials, biochemicals) and other ecosystems services. These diversified and low-input farming systems will emerge if clear benefits to farmers and society are demonstrated and if the downstream value chains are properly organised.

Scope: Proposals should involve field experiments of diversified cropping systems with different species, low-input agronomic practices in conventional and/or organic sectors, and locations in Europe over several years, in order to optimise the use of resources and increase overall farm yield and/or the land-equivalent ratio thanks to the synergistic effect of crop associations in time and space. Proposals should investigate crop diversification by growing different crop species on the same land in successive growing seasons (i.e. rotation) and within a growing season (i.e. multiple cropping), and growing different species in proximity in the same field (i.e. mixed, row and strip intercropping). Proposals should address all these options (rotations, multiple cropping and intercropping) using either only annual crops (scope

A) or annual and perennial crops (scope B). Proposal should consider activities on improved machinery for low-input agronomic practices and harvesting. Breeding activities are excluded. Technical, economic, social and environmental evaluations of the tested diversified systems should be carried out at farm level.

The proposals should also investigate, on the basis of existing case studies, how downstream value chains and the various actors and stakeholders involved (e.g. farmers, cooperatives, logistics providers, industry, consumers) can be impacted by the diversification of cropping systems. Proposals should carry out technical, economic, social and environmental evaluations of the diversified systems at overall value chain level, on the basis of case studies, quantifying the potential for food, feed and industrial products from harvested crops and residues/co-products. Proposals should address technical, social, cultural and economic barriers (e.g. logistics, volume of markets, transparency along the chain, payment for ecosystem services) and drivers. Proposals should analyse path dependencies and lock-ins affecting the various actors and produce roadmaps/recommendations for successful value chain organisation, with a focus on resource-efficiency along the chain.

Proposals should fall under the concept of the 'multi-actor approach'[117] engaging relevant actors such as farmers, cooperatives, logistics providers, industry and should include public engagement targeting consumers and civil society. SME participation is encouraged. Selected projects should liaise closely together and with complementary activities funded in response to topic SFS-02-2016 on 'mixtures and associations in cropping systems' and SFS-31-2016 on 'farming for tomorrow'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless. this does not preclude the submission and selection of proposals requesting other amounts. At least, one project in scope A and one project in scope B will be funded (above the evaluation threshold).

Expected Impact: The expected impact of the project will be assessed on the basis of:

- higher arable land productivity, and land-equivalent ratio for intercropping systems;
- diversification and increase of farmers' revenues through access to new markets and reduced economic risk;
- lower environmental impact of diversified cropping systems with reduced use of pesticides, chemical fertilisers, energy and water;
- improved delivery of ecosystem services, including biodiversity, soil fertility, pest and disease control, groundwater and surface water quality and carbon sequestration;

[117] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- organisation of resource-efficient downstream value chains with the involvement of relevant actors and decreased use of energy along the chains;
- market provision of food, feed and industrial products from harvested crops and residues/co-products produced from diversified cropping systems; and
- increased awareness and knowledge/data exchanges among actors on the benefits of diversified cropping systems (covering different pedo-climatic conditions, using different crops) and on downstream value chain organisation across Europe.

In the long term, this action will help to increase crop diversification and biodiversity in Europe, which is an objective of the common agricultural policy. It will also contribute to the sustainable development of the bioeconomy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-07-2016: Resource-efficient and profitable industrial crops on marginal land

Specific Challenge: Industrial crops can contribute to the diversification of farmers' income and to the supply of renewable raw materials for industrial applications fostering the bio-based economy and climate-change mitigation. To avoid land-use competition with food, it is important to promote the development of resource-efficient varieties that can grow on marginal land (i.e. areas facing natural constraints[118] such as low soil productivity or extreme climatic conditions) while generating technical and economic benefits and limiting environmental impact.

Scope: Proposals should provide an up-to-date database of existing resource-efficient industrial crops (species and varieties) with their characteristics, needs, performance and end-use applications (e.g. fine or bulk chemicals, materials, energy). Proposals should test, validate and disseminate this tool with the involvement of end-users (e.g. farmers, industry). Proposals should map marginal land in Europe that is most suitable for industrial crops, taking account of socio-economic (e.g. accessibility) and environmental considerations (e.g. conservation of biodiversity and continuity in the provision of ecosystem services), such as EU and national mapping and assessment of ecosystems and their services. Proposals should analyse best-practice cases of industrial crop cultivation and address technical, social, cultural, environmental and economic barriers to and drivers of the use of marginal land for industrial cropping. Proposals should produce policy recommendations and best-practices guides to promote the appropriate sourcing of renewable materials from marginal land at local/regional level.

[118] See JRC guidance document on "Scientific contribution on combining biophysical criteria underpinning the delineation of agricultural areas affected by specific constraints, http://publications.jrc.ec.europa.eu/repository/bitstream/JRC92686/lbna26940enn.pdf

Proposals should identify the most promising industrial crop species suited to cultivation on large areas of appropriate marginal land in Europe, and plan breeding programmes and field tests to advance genetics and low-input agronomic practices, thus improving the technical, economic and environmental performance of these crops.

Proposals should fall under the concept of the 'multi-actor approach'[119] engaging relevant actors such as researchers, farmers, cooperatives, industrial players from various sectors (e.g. bioenergy, biochemical and biomaterial sectors) and civil society organisations. SME participation is encouraged. Dissemination and networking activities should focus on the promotion and use of the tools and guides that are developed (i.e. industrial crop database, mapping of most suitable marginal land, policy recommendations and guides at local/regional level).

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

Expected Impact: This action contributes to an increased sourcing of renewable materials from marginal land with the production of low-indirect land use change (i.e. avoiding displacement of agricultural production for food and feed or of forest production), low-input and economically profitable industrial crops for farmers. Applicants will measure the expected impact of the project on the basis of:

- increased awareness and knowledge/practice exchanges among actors across Europe on growing industrial crops on marginal land with different pedo-climatic conditions, using suitable crops and appropriate agronomic practices;
- improved agronomic practices with limited input use (e.g. pesticides, chemical fertilisers, energy and water) and improved genetics of industrial crops potentially best suited to marginal land in Europe; and
- the diversification and increase of farmers' revenues through access to new markets.

In the long term, the results will foster the development of the bio-based economy and contribute to achieving energy and climate targets.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[119] See definition of the 'multi-actor approach' in the introduction to this Work Programme part

RUR-08-2016: Demonstration of integrated logistics centres for food and non-food applications

Specific Challenge: Most agro-industries [120] are surrounded by biomass such as agricultural/forestry residues and industrial crops, and produce by-products which could be used as raw materials for industrial and farming applications (e.g. biochemicals, biomaterials, bioenergy, organic fertilisers). These agro-industries work seasonally and could diversify their regular activity in non-productive periods by organising the logistics and pre-treatment of available local biomass, thus developing synergistic logistics centres for food and non-food uses. These centres will contribute to the efficient organisation of new biomass supply chains, while supporting rural development by creating logistical activities and jobs at local level.

Scope: Proposals should demonstrate the technical and economic feasibility of integrated biomass logistics centres for food and non-food products under real operational conditions (TRL:6-8), taking advantage of the seasonal nature of the activities of agro-industries. At least two demonstrations of logistics centres should be performed in different Member States/Associated Countries. Decisions as to demonstration locations should be based on business models identified via a thorough analysis of biomass availability around existing agro-industries and market potential for intermediate products or bio-commodities to be delivered by logistics centres, while identifying potential industrial actors down the value chain, especially at local/regional level.

The logistics centres should develop cost-effective and environment-friendly logistics (e.g. avoiding biomass losses and greenhouse gas emissions) for the collection/harvesting, transport, storage and possible pre-treatment (e.g. biomass densification) of surrounding available biomass such as agricultural/forestry residues and industrial crops, while using agro-industries' existing facilities/equipment to reduce overall logistics costs. Proposals should also investigate the possibility of treating agro-industry by-products (e.g. from crops or livestock) to produce bio-commodities or intermediate products for industrial and farming applications. The environmental impact (e.g. effect on soil compaction, soil fertility and organic content, effect on biodiversity, impact on road transport traffic), economic impact (e.g. economic viability and added value for farmers, forest holders and agro-industry) and social impact of the integrated logistics will be assessed. Recommendations and best-practice guidelines for successful integrated logistics centres will be produced. Selected projects should cooperate throughout the project life and join forces for dissemination activities.

Proposals should fall under the concept of the 'multi-actor approach'[121] engaging relevant actors such as farmers/forest holders, cooperatives, logistics providers, industries and researchers. SME participation is encouraged.

[120] post-harvest activities involved in the processing, preservation and preparation of agricultural production for intermediary or final consumption (mainly food industries)

[121] See definition of the 'multi-actor approach' in the introduction to this Work Programme part

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

Expected Impact: This action contributes to the creation of new sustainable value chains for non-food applications based on available biomass at local level, fostering the bioeconomy. Applicants will measure the expected impact of the project on the basis of:

- improved technical, economic and environmental logistics for the demonstrated centres;
- improved knowledge of business models for logistics centres, including a thorough understanding of their potential for development, performance and interest in economic, environmental and social terms, and success factors or reasons for failures; and
- the diversification and increase of farmers'/forest holders', agro-industries' revenues in rural areas.

In the longer term, the results will increase the attractiveness of rural areas around logistics centres for new industrial players which can benefit from industrial symbiosis.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-09-2017: Business models for modern rural economies

Specific Challenge: The modernisation of rural economies depends on the capacity of rural businesses to cooperate successfully to form efficient value chains which will deliver competitive products and services, high-quality and diverse jobs, and resilience to global economic and climate changes. The greater interest being shown in regional and local economies, resource-efficient and low carbon value chains or short supply chains provides opportunities to rethink and improve value chain organisation so as to turn specific assets into economic, environmental and social benefits, including through enhanced valorisation and optimisation of ecosystem services. There is a need to identify business models that have the most potential to empower rural communities to take advantage of these opportunities.

Scope: Building on the outcomes of past European projects on rural economic development and rural jobs, proposals will identify innovative business models that are developing in rural areas, have significant potential to create added value, social cohesion and jobs, and are likely to be upscaled to or replicated in other areas, taking into account the diversity of conditions in different areas. Proposals should undertake socio-economic analyses to identify, describe and benchmark different business models in terms of starting conditions, obstacles faced, enabling factors, financing mechanisms, generation of added value, jobs and other potential environmental and social benefits, gender issues, attractiveness to young workers, and the

distribution of the value generated, exploring the concept of shared value. Particular attention should be paid to models that foster a more sustainable mobilisation of resources, improved cooperation between operators along the value chain and/or across traditional and developing sectors (e.g. via clusters/platforms), and lead to new products or services, and the recycling or up-cycling of materials. Proposals should consider food, bio-based value chains and other forms of rural business or service, in particular those based on digital technologies or valorisation and optimisation of ecosystem services. Proposals should produce practical and business-oriented tools, e.g. a collection of business cases, targeting new entrepreneurs who would like to set up businesses in rural areas and seek guidance and benchmarks on similar businesses to draw up their business plans.

Proposals should fall under the concept of' the multi-actor approach'[122], engaging relevant actors such as businesses/entrepreneurs, business or economic development organisations and innovation support services, involved in development of these new business models. Communication and dissemination activities should be carefully planned and targeted to reach audiences likely to take up, replicate and adapt the business models identified.

Selected projects should cooperate closely to maximise impact across Europe (e.g. production of common tools for entrepreneurs and stakeholders, joint analysis and recommendations, joint dissemination plans).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: This action contributes to the modernisation and sustainable growth of rural economies. Applicants will measure the expected short-term impact of the project on the basis of:

- improved tools for entrepreneurship in rural areas, in particular with a database of business cases and supportive environment (e.g. clusters/platforms, technical/scientific services and infrastructure, advisory services, funding opportunities); and
- improved knowledge of business models emerging in rural areas, including a thorough understanding of their potential for development, performance and interest in economic, environmental and social terms and success factors or reasons for failures.

In the longer term, the results will:

- increase the potential for rural economic diversification, added value and job creation in a variety of rural areas thanks to the dissemination of promising business cases;
- make rural economies and societies more resilient to global changes; and

[122] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- improve the delivery of ecosystem services resulting from innovative forms of valorisation.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INNOVATION AND SKILL DEVELOPMENT

Proposals are invited against the following topic(s):

RUR-10-2016-2017: Thematic Networks compiling knowledge ready for practice

Specific Challenge: Despite the continued generation of knowledge through scientific projects, research results are often insufficiently exploited and taken up in agricultural practice, and innovative ideas and methods from practice are not captured and spread. National and sectoral agricultural knowledge and innovation systems (AKISs) are insufficiently connected to fully meet this challenge. In view of fostering economically viable and sustainable agriculture and forestry, it is essential to close the research and innovation divide and to act at EU level. More cooperation is needed between researchers, advisors, farmers/foresters and other actors in the supply chain to stimulate knowledge exchange so as to optimise resource use and smooth the transition to a knowledge-driven agriculture. Thematic networks are a key element in the implementation of the EIP Agricultural Productivity and Sustainability (EIP-AGRI) with a view to fostering cross-border knowledge exchange and they may enable links being established with and between the EIP-AGRI Operational Groups supported under rural development programmes.

Scope: The activities of thematic networks include summarising, sharing and presenting, in a language easily understandable for agricultural/forestry practitioners, existing best practices and research results that are near to be put into practice, but not sufficiently known by practitioners. To this end, the networks shall involve a wide range of actors covering both science and agricultural/forestry practice on the specific themes, e.g. scientists, farmers/farmers' groups, advisory services. Also EIP Operational Groups and interactive innovation groups operating in the context of the EIP-AGRI, enterprises or supply chain actors should be involved if relevant for the chosen theme. The specific themes of the networks, which may be chosen 'bottom-up', should contribute to a more competitive and sustainable agriculture and forestry. They must focus on the most urgent needs of specific agricultural or forestry production sectors, or on important or promising cross-sectoral issues, including where primary production needs to improve its linkages to the supply chain. A comprehensive description of the state of the art on the chosen theme should explain the added value of the proposal, the relevance of the theme and how it avoids duplication with

existing or completed projects and networks. The resulting easily accessible end-user material should be substantial in number and feed into the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability' for broad dissemination to agricultural/forestry practitioners. In the exceptional event that minor testing of specific solutions would be needed, a maximum of 20% of the project budget may be used for this purpose. Proposals should fall under the concept of the 'multi-actor approach'[123].

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

Expected Impact: This action should contribute to the successful deployment of the vast reservoir of existing scientific and practical knowledge on the chosen theme, and improve knowledge exchange between scientists and practitioners on agricultural and forestry practices. Impact can be measured on the basis of:

- the collection and provision, through the main existing dissemination channels most used by practitioners, of easily accessible practice-oriented knowledge on the thematic areas, so that the material (including material for training and educational purposes) remains available in the long term, beyond the project period;
- greater user acceptance of collected solutions and more intensive dissemination to end-users;
- increased flow of practical information between geographical areas in Europe concerned by the themes(also taking account of the differences between the territories); and
- support for the implementation of the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability', through interaction with Operational Groups, and in particular through the delivery of a substantial number of “practice abstracts” in the common EIP-AGRI format[124], including audio-visual material wherever possible.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[123] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

[124] The common format for practitioners is available at: https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format

RUR-11-2016: On-farm demonstrations: deepening farmer-to-farmer learning mechanisms

Specific Challenge: Improving the sustainability of European farming systems and facilitating their transition is a key objective of the Common Agricultural Policy and of Horizon 2020. Research and innovation activities should play a key role in efforts to move towards more sustainable and resilient production systems, but often this is undermined by the lack of efficient approaches to convince the farming community and demonstrate the validity of innovative knowledge. Best practices often remain tacit knowledge within local communities and are not spread across the EU territory or made known to researchers. Also, it is recognised that a farmer's main source of information is other farmers, and their experience and opinions are often decisive.

Demonstration and pilot farms have a major role to play in the application of scientific findings and the spreading of best practices and innovative farming approaches within the farming community. Efforts are needed to develop their potential and prepare for European connectivity. Condition for effective peer-to-peer learning is that the demonstration farm operates under the same conditions as average commercial farms, i.e. subject to normal regulatory constraints and using the alternative production systems or agricultural practices/technologies in the course of its normal commercial farming activity.

Scope: Proposals should involve producing a geo-referenced inventory of existing demonstration farms, providing an analysis of the key elements of efficient demonstration techniques and exploring the potential of farmer-to-farmer learning. In a first step, activities should map open commercial farms that engage in demonstration activities in Europe and describe the mediation techniques they apply. This inventory should be organised around a list of sectoral themes (focusing on specific primary products, e.g. crops, livestock, etc.) and also non-sectorial/cross-cutting themes (e.g. specific farming systems, energy saving, supply chain initiatives, care farming, etc.).

From this inventory of open farms, proposals shall take a broad range of cases with a geographical coverage representative of EU agricultural sectors, systems and territories. They will analyse the various types of demonstration farms and programmes that use a commercial farm setting, looking at what they do, how they do it, who plays what role, and what is the impact. Project activities should result in a better insight in approaches and policies to encourage effective demonstration activities, and add value in this respect to the European Innovation Partnership "Agricultural Productivity and Sustainability", its networking activities (e.g. EIP Focus Groups) and its Operational Groups.

To deepen understanding of effective demonstration activities, consortia will include a sufficient number of actors with practical experience of such activities, including, as a minimum, agricultural/forestry practitioners (demonstration farms) and intermediary persons/bodies organising or facilitating on-farm demonstrations. Proposals should fall under

the concept of the 'multi-actor approach'[125] and may involve a wide range of actors, such as farmers/farmers' groups, advisors, innovation support services, researchers, social scientists, EIP Operational Groups[126], national/regional networks and enterprises or other supply chain actors where relevant.

Proposals should provide input for and look for synergies with topic RUR-12-2017 to ensure that the inventory of demonstration farms and best demonstration practices resulting from this topic result in concrete thematic knowledge exchange activities across European sectors and systems under that topic. Projects should provide input to and liaise with the SCAR- AKIS Strategic Working Group.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million and a maximum period of 30 months would allow for this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: This activity should produce a better overview of effective practical approaches for demonstration activities on commercial farms. An inventory of demonstration farms and an analysis of their techniques, and the policies supporting these, would promote farmer-to-farmer learning. The following impacts can be expected:

- an inventory of open farms engaging in demonstration activities in Europe, detailing the sectors, themes and topics on which they provide particular expertise, which feeds into the EIP-AGRI web-databases;
- a set of best practical approaches for demonstration projects and programmes that are effective in increasing application of innovative entrepreneurial practices and scientific knowledge;
- improved understanding of effective demonstration approaches, project types and programmes, and of the increased potential for knowledge exchange offered by farmer-to-farmer learning. This should cover both demonstration of research results and the spreading of best farming practices among practitioners, possibly accompanied by a limited set of appropriate indicators to measure the impact of such activities;
- recommendations for Agricultural Knowledge and Innovation System (AKIS) governance and policies on how to support effective demonstration activities;
- the adding of value to the European Innovation Partnership "Agricultural Productivity and Sustainability", its network and its Operational Groups; and

[125] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

[126] For the EIP and RD Operational groups, see introduction to the Work Programme and http://ec.europa.eu/eip/agriculture/

- a basis, organised around a list of themes, to support networking and learning among commercial demonstration farms in the EU territory under RUR-12-2017 contributing to a more competitive, sustainable and climate-smart agriculture and forestry.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-12-2017: Networking European farms to boost thematic knowledge exchanges and close the innovation gap

Specific Challenge: Demonstration and pilot farms have a major role to play in peer-to-peer learning in the broader farming community and for the effective transfer of knowledge on practical farming approaches. They are also a perfect instrument for disseminating possible innovative approaches resulting from scientific work. In addition, demonstration on "real" farms allows actors to meet, network and exchange knowledge beyond the classical knowledge transfer activities. Existing demonstration farms or experimental farms in specific thematic areas need to be connected and networked within Europe so that they can do more with less. The financial crisis and the launch of the EIP "Agricultural Productivity and Sustainability"(EIP-AGRI)[127] raised awareness of the fact that farming infrastructure for demonstration purposes is costly and that thematic expertise should be shared within Europe. Beyond demonstration, thematic farm networks could develop increased interaction between science and practice, e.g. by for discussing research outputs, capturing research needs from practice, and providing a base to develop interactive innovation projects[128] responding to the needs or opportunities of the farming community. Connecting existing open-farm initiatives at local level with a view to better coordination is expected to generate 'EU added value'.

Scope: Projects should set up network activities between geo-referenced demonstration farms dealing with specific themes across Europe with a view to exploiting their potential to improve delivery of practice-oriented knowledge and enhance interactive activities. Projects should cover a wide range of themes to be chosen according to where most added value for the EU is to be expected, and should contribute to a more sustainable and resilient agriculture and forestry. The themes would cover both sectoral approaches (e.g. specific crops or livestock) and cross-sectoral themes, for instance specific farming systems, management of soils / nutrients / water / biodiversity / landscape / supply chains, resource efficiency, agro-ecology, precision farming, environmental/climate farming challenges, integrated pest management, animal welfare, effective, resilient and biosecure livestock systems, resilient cropping, energy production and management, speciality crops, biomass applications etc. As a minimum, 10 themes should be covered. Projects should organise knowledge exchange activities and provide for connection with, and structured output from, exemplary

[127] http://ec.europa.eu/eip/agriculture/

[128] For the interactive innovation model, see the introduction to this Work Programme.

demonstration farms that appeals to the average farmer and can be shared across Europe, e.g. farm visits, visual material (photos, video etc), easy-to-read texts, etc. The project activities should ensure synergy and complementarity with the EIP-AGRI, by thematically showcasing and cross-fertilising innovative practices/methods, and by delivering related audio-visual material and practice abstracts in the common EIP-AGRI format for practitioners[129]. They should also seek to use and complement outputs from relevant European, national and regional projects or clusters around the chosen themes, e.g. Focus Groups[130], Operational Groups[131] and Thematic networks[132].

The demonstration networks should develop linkages with advisors and their activities. Proposals should fall under the concept of the 'multi-actor approach'[133], involving a wide range of actors with practical experience, such as farmers/farmers' groups, advisors, innovation support services, researchers, Operational groups, EIP national/regional networks and enterprises, or other supply-chain actors where relevant. They should look for synergies with the inventory of demonstration farms and best demonstration approaches delivered under topic RUR-11-2016 and coordinate their strategy with the SCAR- AKIS Strategic Working Group. Activities and networks would extend for periods longer than four years where appropriately substantiated and organise synergies with activities and groups within the EIP-AGRI.

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

Expected Impact: This action should initiate structured networking activities between demonstration farms in a broad range of specific themes with a view to boosting innovation across Europe. The following impacts can be expected:

- increased flow of practical information on specific themes between relevant geographical areas in Europe, exploiting possible complementarities with existing projects and networks;
- a series of activities spreading thematic innovative knowledge, on which Operational Groups under rural development and the EU wide EIP-AGRI network can build;
- support for the implementation of the EIP-AGRI, through a structured organisation of the flow of information on the specific themes between the relevant geographical areas,

[129] The common format for practitioners is available on https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format

[130] See https://ec.europa.eu/eip/agriculture/en/content/focus-groups for the list of EIP Focus Groups

[131] See EIP website http://ec.europa.eu/eip/agriculture for the list of Operational groups

[132] See EIP website http://ec.europa.eu/eip/agriculture for the list of Horizon 2020 Thematic Networks

[133] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

resulting in an increased networking and learning among open farms and farmers in Europe;

- increased farmer-to-farmer learning and visibility of on-farm demonstrations on specific themes, helping to spread promising best practices and ensuring a timely uptake of research results by the farming community, and fuelling interactive innovation projects and approaches; and

- a greater user acceptance of the shared information contributing to a more competitive, sustainable and climate-smart agriculture and forestry.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-13-2017: Building a future science and education system fit to deliver to practice

Specific Challenge: Transition towards more sustainable agriculture, forestry, food and bio-based value chains, equipped to face the challenges ahead, requires a renewal and strengthening of the technical and soft skills of all concerned. Along with ensuring delivery of peer-reviewed output from practice-oriented research, this will contribute to an efficient and interactive agricultural knowledge and innovation system (AKIS).

In 2010, 71% of European farm managers were operating on the basis of practical experience only. Education levels vary greatly depending on country, farm manager's age and gender, or farm structures, and this can hamper innovation. As the proportion of farmers with secondary and tertiary education rises, education will play an increasing role in farmers' capacity to co-create and implement new techniques and practices, anticipate and adapt to legislative, policy, market and environmental changes, design innovative ways of marketing their products and take part in interactive innovation systems and networks. New production processes and new types of supply chain in the wood, food and bio-based industry sectors also create a business demand for new skills. On the science side, there may be a shortage of researchers and capacities in fields of science of crucial importance for sustainable agriculture which are under-developed or unattractive in Europe.

While basic research remains necessary, a crucial challenge is also to remove bottlenecks to the delivery of practice-oriented research to end-users. Current research evaluation systems are based mainly on scientific publications and give little incentive, appreciation or reward to scientists willing to invest in practice-oriented research. Some front-runners are engaging in new ways of rating such research activities that deserve to be assessed, applied to agriculture and may be upscaled to a wider range of research providers and funding bodies.

Scope: Proposals will involve the production of a challenge- and foresight-based inventory of skills that will be needed in agriculture, forestry and related value chains, covering primary

producers, advisors, industry, businesses and scientists. Proposals will review how current science, education and training systems in a wide and varied range of EU Member States (and possibly third countries) cater for these needs, seeking to draft roadmaps for the improvement of curricula, learning methods and long-term interaction between education, science and economic players. Particular attention should be paid to soft (e.g. entrepreneurial, intermediation and communication) skills in particular for farmers, advisors and researchers, and technical skills related to new practices or processes and sustainability requirements in scientific fields of importance for the future. Needs should be differentiated in the light of the variety of farming systems, current trends in structural change, emerging business models in farming and subsequent value chains and geographical conditions. Proposals should analyse how education and training systems could improve, in particular by attracting more farmers and other players to engage in sufficient education and lifelong learning and by ensuring that these systems are fit for purpose and permanently updated. Piloting of new curricula and training methods in some of the participating institutions could be considered. The effectiveness of existing EU policy instruments on education and training in this area should also be assessed and improvements proposed. Proposals will take into account relevant EU initiatives to ensure potential synergies (e.g. Erasmus+, Marie Skłodowska-Curie actions, Knowledge and Innovation Community Food for Future, etc.).

Furthermore, proposals should develop an operational system for encouraging and measuring performance and reviewing outputs of interactive innovation and practice-oriented research, with a view to improving their effective delivery and the uptake of best practices from the field. They should build on front-running initiatives and assess different options currently being tested in the EU or elsewhere (e.g. the EIP-AGRI common format). Activities should deliver practical methodologies and criteria for i) measuring performance of research providers and projects with regard to their outputs for practice; and ii) translating academic knowledge into practical knowledge easily understandable by end-users. To this end, proposals should develop a peer-review system for research outputs ready-made for delivery to farmers and foresters, exploring all components required to operate such a system.

Proposals should build on the analysis to make further policy recommendations on how to develop education, training and science in the future. Proposals should fall under the concept of the 'multi-actor approach'[134] and be highly participatory, involving specialised education bodies, farming/forestry sector representatives and advisors from the outset of project development to maximise bottom-up elaboration and final uptake of project results. It may be useful to involve authorities in charge of curriculum development and measuring research impact. Communication and dissemination activities should reach out far beyond the consortium to improve the uptake of research results.

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

[134] See definition of 'multi-actor approach' in the introduction to this Work Programme part.

Expected Impact: This action should improve the performance of science and education systems and their benefits for agricultural and forestry sectors and related industries. The following impacts are expected:

- a shared inventory of the skills needed for a transition to more competitive and sustainable agriculture and related value chains, serving as a basis for continuous and longer-term cooperation between education bodies across Europe, leading to intensified exchanges and regular updates of the inventory;
- improved technical and soft skills for farmers, foresters, advisors, industry employees and scientists, translating into better farm management, increased competitiveness, sustainability and resilience to environmental, climate and market changes;
- greater awareness of gaps in research capacities and specific fields of science of crucial importance for sustainable agriculture;
- increased efficiency of agricultural knowledge and innovation systems in the EU thanks to i) improved linkages between education, science and economic players, ii) enhanced capacity of players to interact with one another, and iii) contribution to an institutional shift towards better recognition and rewarding of practice-oriented research;
- improved quality and usefulness of research outputs for the immediate use by farmers, foresters or value-chain businesses, thanks to a peer-review system leading to an improved implementation of research results by end-users and an innovative agricultural sector; and
- recommendations for improved policies for education, agriculture, research and innovation at European, national and regional levels.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-14-2016: Advisors' roles in the functioning of AKIS and advisory policies boosting innovation in sustainable agriculture

Specific Challenge: There is a need to analyse the role of advisors in the Agricultural Knowledge and Innovation System (AKIS) and explore farmers' decision making processes.

Advisors' short- and long-term influence on farm decisions, their impartiality and the way practical knowledge is kept public and conserved in the longer term are determined by how various types of advisor are embedded in their national or regional AKIS, by how public and private advisory services interact, and by the type or combination of financing sources they use. This complex relationship is governed by public policies at national, regional and EU

level and increasingly impacts on whether society can sufficiently move to more sustainable agricultural systems.

While the term 'advice' normally refers to an 'opinion or recommendation offered as a guide to action' in a context of linear knowledge transfer from science to agricultural practice, the term 'advisor' appears to cover various and different roles. The role that authorities and private industry attribute to advisory services, and their expectations in terms of how this will help them fulfil their own objectives needs to be researched if we are to understand how AKIS really functions. New approaches need to be developed to enhance advisors' potential to boost innovation through their function as intermediaries connecting science and practice. The focus should be on the farmers' needs and behaviour, improving connections with research and finding ways of providing accurate and timely advice, including the use of new ICT advisory tools. The quality, efficiency and effectiveness of an advisory service rely on a relationship of trust over time between advisor and farmer and on the advisors' qualifications, experience and networking capacity. Therefore, the sustainable financing of specific basic functions of existing public/private advisors may be a key to success. The growing number and impact of private advisors and the shrinkage of public extension services makes cooperation between different types of advisors more challenging. New forms of interaction among advisors and between advisors and scientists need to be explored, in order to ultimately improve knowledge flows in Member States' AKIS and in the EU, and to conserve and develop public knowledge for agriculture.

Scope: Considering the different types of farming systems and farmers, proposals should examine how farmers make their decisions and who influences them most. Within this context, activities should analyse the role of the various types of advisor in the AKISs. Taking into account the impact of face-to-face interaction, projects should identify the key factors in the creation of trust between farmer and advisor so as to enable effective knowledge transfer and exchange. They shall, as a minimum, explore the relationship between advisors and researchers and between advisors and farmers, identifying the main elements facilitating the flow of information in both directions. Apart from linear knowledge transfer processes, particular attention should be paid to advisors' potential to boost innovation, inter alia by funnelling practice needs into research activities, participating and intermediating in farmer-to-farmer learning processes and interactive innovation projects [135], and by acting as innovation brokers or as an innovation support service encouraging innovation projects and capturing grass-roots innovative ideas from practice for further development.

Moreover, projects should examine which governance models are most appropriate for empowering such multi-functional advisory services: how can the various advisory roles be embedded in regional, national and EU AKIS policies, how can public and private advisors be interconnected (both at MS and at EU level), are they in competition or well-coordinated, how is the lifelong training of advisors organised (who, when, why etc), what are the minimum

[135] For the interactive innovation model, see the introduction to this Work Programme part.

education requirements for an advisor, how to support farmer-to-farmer learning or organise knowledge building using ICT tools or the internet, etc.

Proposals shall also explore the role of advisors in innovation networks at local, regional, national and European level (e.g. within the EU Farm Advisory System, the European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) network, National Rural Networks, the European Network for Rural Development, Leader, etc.) and the role of farmers' associations (trade unions, cooperatives, irrigation associations, etc.) or private advisors linked to agricultural input suppliers.

Activities should analyse the impact of funding for multi-functional advisory services under national policies and the Common Agricultural Policy (CAP) in general, including the impact of public procurement for the selection of advisory services, possible difficulties for smaller advisory services wishing to participate, the requirement that advisors should follow regular training etc. Projectss shall identify best practices from a broad series of practical cases across the EU. They fall under the concept of the 'multi-actor approach[136]'. Consortia must include a range of key actors with practical experience in the subject such as private and public advisors and advisory services, and also other relevant players such as farmers, farmers' organisations, social scientists, researchers, authorities, businesses or cooperatives providing advice etc. The project should provide input to and liaise with the SCAR- AKIS Strategic Working Group.

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

Expected Impact: This action should contribute to understanding the future role of advisors in AKIS and their potential to boost innovation, and improve related public policies. The following impacts can be expected:

- improved understanding of farmers' decision making processes across the EU and the impact of advice/advisory services on the sustainability of agricultural practices;
- enhanced impact of advisory systems on the strengthening of knowledge flows between science and practice, including suggestions for efficient support and training systems for advisors
- from the cases discussed, a set of good examples and best practices for well-connected and effective advisory systems, focusing on ways of preserving practical knowledge in the long-term and including identification of success elements and possible novel roles for advisors with a view to boosting innovation and improving networking;

[136] See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

- transition pathways and recommendations for improving the performance and effectiveness of advisory services, including interconnection and networking of advisory services and innovation support services at national/regional and EU level, supporting the implementation of the EIP AGRI;

- suggestions for governance models and public policy mechanisms, contractual arrangements and appropriate funding instruments providing effective support for improved interactivity of advisors, enhancing innovation-driven research and advisory services to support the transition to more sustainable and climate-smart agriculture; and

- suggestions on how to deepen the networking capacity and impact of the CAP's horizontal Farm Advisory System, including a thorough understanding of the impact of and mechanisms under 2014-2020 rural development support for advisory services.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-15-2017: The benefits of working with others – fostering social capital in the farming sector

Specific Challenge: The environmental and economic sustainability of the farming sector depends to a great extent on farmers' and land managers' capacity to develop activities and participate in networks with fellow farmers, groups and other entities or individuals. Despite the benefits of such approaches, farmers' involvement in them is low in a number of European countries, for various reasons. To address this, we need to investigate and find ways of overcoming the constraints and disincentives that impede the development of such approaches in different areas of collective action (productivity, information sharing, sustainability).

Scope: Proposals will primarily cover EU Member States where the level of organisation of farmers and land managers is considered low. Activities will address constraints on the development of cooperatives/networking activities in particular areas (economic activity, environmental sustainability etc.) and draw up solutions based on case studies, identified best practices, participatory workshops, etc. Proposals should fall under the concept of the 'multi-actor approach'[137].

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

Expected Impact: The project results are expected to:

[137] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- improve understanding of farmers' attitudes to cooperation and networking;
- provide recommendations for policy-makers to foster social capital in the farming sector; and
- lead to higher levels of farmer organisation in the medium to long term.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-16-2017: Optimising interactive innovation project approaches and the delivery of EU policies to speed up innovation in rural areas

Specific Challenge: A number of recent initiatives and instruments for speeding up innovation deserve in-depth exploration. Horizon 2020 and the European Commission's Communication on the *CAP towards 2020* have focused attention on innovation in agriculture and related sectors. The European Innovation Partnership (EIP) "Agricultural Productivity and Sustainability", a new approach under the Europe 2020 strategy, aims to speed up EU research and innovation by linking existing policies, instruments and actors. The agricultural EIP in particular implements the interactive innovation approach which relies on knowledge exchange and the empowerment of all actors concerned, and focuses on getting results implemented in practice. An EU wide EIP network is connecting the EIP Operational Groups funded under rural development programmes and provides interaction with Horizon 2020 projects. Apart from Horizon 2020 multi-actor research projects and thematic networks compiling practice-ready knowledge, other EU and national policies may also contribute to innovation, e.g. the Farm Advisory System, Rural Development funding supporting farm advisory services, knowledge and information actions, LEADER, specific national/regional or particular H2020 instruments etc. All of these contribute to innovation in agriculture and forestry. The challenge is to improve their targeting and interlinking - if and where needed - , and possibly learn from relevant insights from outside Europe.

Scope: Proposals should explore how instruments and approaches under the various policies could be further adjusted and how they contribute to innovation in the agricultural and forestry sector. Learning also from experience at international level, proposals should investigate the design and implementation of interactive innovation projects[138], on the basis of a substantial number of case studies of interactive projects in a broad range of agriculture and forestry sectors.

An essential part of this topic would develop detailed best practices/approaches for H2020 multi-actor projects and thematic networks at project level. On the basis of a series of cases of existing multi-actor projects and thematic networks, proposals should develop best practices

[138] For the interactive innovation model, see the introduction to the Work Programme.

for consortia to combine as much as possible both scientific and practical knowledge in their projects and exploit them to the full. Special attention needs to be given to the role of facilitators that mediate between different types of actor and to the particular management/coordination needs of this type of project, with a view to intensifying knowledge exchange between actors. Examples of unsuccessful approaches where project implementation is not delivering as expected are also relevant: 'facts', 'feelings' and group dynamics should be taken into account. Activities should investigate how co-creation and co-ownership of project results can be improved and quantified/qualified in order to speed up the use of project results in practice. Activities will examine how practically/legally to construct consortia with different types of actor, taking into account the different status of the various types of organisations involved (partner, subcontractor, etc). Projects should also explore pathways for involvement of secondary and higher education as actors in interactive innovation projects, including H2020 multi-actor projects, thematic networks and EIP Operational Groups. Furthermore, activities should examine how multi-actor projects and thematic networks can seek synergies and intensify effective linkages with Operational Groups and other interactive innovation projects under national/regional/European policies.

Proposals should fall under the concept of the 'multi-actor approach'[139] involving key actors in the AKIS (farmers, advisors, researchers, research bodies, social scientists, managing authorities, network agents, enterprises, etc.) and using the work of the SCAR-AKIS Strategic Working Group, as appropriate. They may include insights from outside Europe.

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

Expected Impact:

- a description of supporting mechanisms and governance for a more efficient management of interactive innovation projects, including pathways for improved interaction with existing sectoral, rural and innovation actors and networks at local, regional, national and EU level and to the Farm Advisory System under the Common Agricultural Policy;

- development of best practices for building and implementing multi-actor project proposals and consortia under H2020, including thematic networks compiling knowledge for practice;

- delivery of a set of good examples of various types of multi-actor research projects and thematic networks which compile practice-ready knowledge and connect successfully with Operational Groups;

[139] See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- better quantitative and qualitative measurement of scientific efforts impacting agricultural practices and systems, including the impact of the facilitating actors and the involvement of education; and

- suggestions for public policy governance mechanisms, contractual arrangements and appropriate funding instruments providing for effective interactive projects, enhancing innovation-driven research and advisory services leading to more competitive, sustainable and climate-smart agriculture.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Rural Renaissance - Fostering innovation and business opportunities

Opening date(s), deadline(s), indicative budget(s):[140]

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 27 Oct 2015			
RUR-08-2016 (IA)	12.00		17 Feb 2016
RUR-10-2016-2017 (CSA)	10.00		
RUR-11-2016 (CSA)	2.00		
RUR-01-2016 (RIA)	6.00		17 Feb 2016 (First stage) 13 Sep 2016 (Second stage)
RUR-04-2016 (RIA)	5.00		
RUR-06-2016 (RIA)	20.00		
RUR-07-2016 (RIA)	6.00		
RUR-14-2016 (RIA)	5.00		
Opening: 04 Oct 2016			
RUR-05-2017 (IA)		8.00	14 Feb 2017

[140] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
All deadlines are at 17.00.00 Brussels local time.
The Director-General responsible may delay the deadline(s) by up to two months.
The deadline(s) in 2017 are indicative and subject to a separate financing decision for 2017.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

RUR-10-2016-2017 (CSA)		10.00	
RUR-12-2017 (CSA)		7.00	
RUR-15-2017 (CSA)		3.00	
RUR-02-2017 (RIA)		5.00	14 Feb 2017 (First stage) 13 Sep 2017 (Second stage)
RUR-03-2017 (RIA)		8.00	
RUR-09-2017 (RIA)		9.00	
RUR-13-2017 (RIA)		7.00	
RUR-16-2017 (RIA)		5.00	
Overall indicative budget	66.00	62.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme with the following exceptions:

RUR-08-2016	To maximise the impact of this innovation action, at least two

	demonstrations of logistics centres in different Member States or Associated Countries should be performed, as defined in the topic text.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide published on the Participant Portal.

Consortium agreement: Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

Call - Bio-based innovation for sustainable goods and services - Supporting the development of a European Bioeconomy

H2020-BB-2016-2017

INTRODUCTION

The era of industrial growth supported by an ever expanding and non-sustainable use of fossil resources is rapidly coming to an end. The new wave of industrialisation comes from bio-based industries that produce and use sustainable bio-based resources at competitive prices and convert them into innovative, sustainable and viable industrial products. Championing this paradigm shift, from fossil to bio, will be critical in maintaining and reinforcing the EU industrial base and will contribute to bringing industry's weight in the EU's GDP back to 20% by 2020, from less than 16% today. Bio-based products will provide new markets to biomass producers, strengthening also rural economies and generating high-skilled jobs.

This call will embrace two main aspects of the bio-based innovation. Firstly, it will encompass the production, mobilisation and use of biomass including new business and service models, to sustainably secure raw material supply for a wide range of industrial products taking into account potential trade-offs of competing land-uses. Secondly, it will consider stakeholders engagement and demand-side measures supporting market development of bio-based products.

Within this focus area, two sub-areas have been identified:

- Securing sustainable biomass supply for bio-based goods and services
- Building the "bio-based markets of the future"- mobilising stakeholders engagement

Securing sustainable biomass supply for bio-based goods and services

Biomass is not unlimited and the success of a transition towards a less fossil fuel dependent society where bio-based innovation will play a key role, will depend on our ability to sustainably mobilize the biomass supply necessary for the different end uses. To secure sustainable supply for bio-based good and services, it is critical to diversify and increase the productivity, quality and output of biomass from forest, agricultural and marginal land (including specialised crops) and sea, avoiding the degradation of ecosystems (including soil and water quality and biodiversity aspects). Equally, it is important to unlock the potential of residues, industrial by-products, side-streams and wastes. The regional dimension of feedstocks mobilization and logistics; the need to build bridges between the different actors of the supply chain; the trade-off aspects of biomass uses as well as the need for industry to secure access to sustainable (certified) biomass, are also key aspects.

Building the "bio-based markets of the future"- mobilising stakeholders engagement

Bio-based products market uptake will be affected by economic and social factors such as environmental, health and ethical considerations which will influence consumer's choices; Stakeholders' engagement will be key to help identify and address the different actors' interests, aspirations as well as perceived risks, and to maximise the benefits of new bio-based business models within the society. Also critical for the development of bio-based markets is the continuous work on standardisation, including sustainability indicators, criteria and assessment approaches; the use of standards as well as the innovation in procurement approaches.

The Bio-based Industries JTI represents a major investment in this area. While it covers the whole value chain from the development of innovative feedstock, its conversion in next generation bio-refineries, and supporting markets for bio-based products; its stronger emphasis is placed on development and demonstration of next generation bio-refineries. In this sense, the content of the current call, which is primarily on the upstream (biomass supply) and downstream (market development of bio-based products), complements the activities of the Bio-based industries JTI.

This call contributes to the objectives of the Bioeconomy Strategy, the CAP/Rural development, the integrated Maritime Policy and its environmental pillar, the Marine Strategy Framework Directive; to the Blue Growth strategy, the new EU Forest Strategy, the Industrial renaissance policy and the Strategic agenda for the Union in times of the change for stronger economies with more jobs and a secure energy and climate future.

This call has cross-cutting links with other areas of Horizon2020, being relevant to Secure, clean and efficient energy (Societal Challenge 3), Climate action, environment, resource efficiency and raw materials (Societal Challenge 5), Inclusive, Innovative and Reflective Societies (Societal Challenge 6), and LEIT//Nanotechnologies, Advanced materials, Biotechnology and Advanced manufacturing and processing (NMBP).

Wherever possible, proposers may seek synergies, including possibilities for funding, with relevant national/ regional research and innovation programmes and/or cumulative funding with European Structural and Investment Funds (ESIF) in connection with research & innovation smart specialisation strategies (RIS3).

SECURING SUSTAINABLE BIOMASS SUPPLY FOR BIO-BASED GOODS AND SERVICES

Proposals are invited against the following topic(s):

BB-01-2016: Sustainability schemes for the bio-based economy

Specific Challenge: Sustainability assessments are major factors not only for consumer acceptance but also for developing an efficient and meaningful policy framework for bio-

based products. While there is already a framework in place for the sustainability assessment of biomass and biofuels, there are only incipient initiatives for bio-based products. Objective and quality life cycle assessments based on robust and agreed methods are important to clarify the environmental impact/benefits of bio-based products and to benchmark their environmental performance with alternative non-bio-based products on the market.

Scope: The proposals will develop sustainability schemes for bio-based products building on (1) existing schemes for biomass and bioenergy, including biofuels, (2) the work of (CEN-TC411) on standards for 'Bio-based Products – Sustainability Criteria' and 'Bio-based Products – Life Cycle Assessment' which should incorporate end of life, (3) previous work on bio-based products LCA methods for bio-based products. Aspects that could be considered include: building-in economic and social factors; thresholds for different sustainability criteria/indicators; certification schemes and use of standards; life cycle assessment of bio-based products; (eco)labelling; aspects of the circular economy, resource efficiency and the principle of cascade use considering existing criteria for bioenergy product sustainability; the development of ILUC factors for bio-based products taking into account existing approaches to ILUC for bioenergy. The applicability and efficiency of the proposed sustainability schemes and criteria/indicators in the current regulatory framework; the balance between costs and complexity of the sustainability assessment; and the market pull the specific proposed measures will represent, should be presented as credible cases in the proposal. In this context applicants may decide to focus making the case for specific segment/groups of bio-based products, which should be of course justified.

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

Expected Impact: To contribute to the implementation of the objectives of relevant European policy initiatives, including the Lead Market Initiative in Bio-based Products, the Industrial Policy with its instruments such as the European Innovation Partnership on Raw Materials, the Environmental Technology Action Plan and the Bioeconomy Strategy, proposals will have to:

- Contribute to the development of efficient, implementable and fit-for-purpose sustainability schemes and criteria and indicators;
- Ensure market pull for bio-based products through (i) wider use of bio-based standards and certification schemes and (ii) the expansion of bio-based products accessing sustainability schemes, e.g. (eco)labelling;
- Develop objective and quality life cycle assessments based on robust and agreed methods, allowing benchmarking, accepted and applicable in regulatory and policy frameworks.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BB-02-2017: Towards a method for the collection of statistical data on bio-based industries and bio-based products

Specific Challenge: As compared to bioeconomy sectors such as food-chain or bioenergy which keep hold of consolidated official statistics, there is a current lack of reliable and uniform ones on bio-based industries and bio-based products. In spite of progress made by the European Bioeconomy Observatory and other initiatives to gather data on the use of biomass for bio-based products, the following hurdles are still laying ahead to reach a widespread data availability: (i) There is lack of a comprehensive database with statistics for industrial uses of biomass from primary and secondary sources, (ii) The flow from raw materials to end products cannot be inferred from existing databases, (iii) There is insufficient comparability between different databases, (iv) Methodologies for data collection are not always transparent and existing data rely to a large extent on industry surveys and estimations of experts. This data gap hinders the development of economic models enabling the quantification of the bioeconomy and its economic, environmental and social effects. In turn, it has a negative effect on the ability of policy-makers to set the most appropriate policies to encourage investment in the bioeconomy in view of factors such as competition/synergies and possible trade-offs between various biomass uses.

Scope: Proposals shall develop and implement a method for the collection of data on bio-based products, taking into consideration the incorporation of the data in the European statistical infrastructure (Eurostat), building on and contributing to on-going activities on exemplary bio-based products (Bio-based Succinic Acid & 1,4-Butandiol, lubricants). The following aspects will represent the framework for developing the proposals: (1) links with current CEN standardisation work on bio-based products; (2) training support or technical inputs to official customs and competent laboratory staff in Member States and to relevant activities within the existing programmes such as Customs 2020 and European Union Customs Competency Framework (EU Customs CFW); (3) definition of the minimum bio-based carbon and/or bio-based content for some bio-based product groups (except bio-based lubricants); (4) data compatibility with European and international databases (e.g. FAOSTAT, PSD, etc.). Data generated should be fed into economic models, existing or newly developed, enabling the description of the development of the bioeconomy, its interaction with the rest of the economy, and its economic, environmental and social impact. Consortia should include a balanced combination of expertise on bio-based products, statistical reporting from Member States and modelling. Proposals should build upon the existing work of completed and on-going projects, including the current activities of the Bioeconomy Observatory, RRM-Group as well as the Commission study on Biomass Supply and Demand.

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

Expected Impact: As a step forward in setting the most appropriate policies to encourage investment in the bioeconomy and defining possible trade-offs between various biomass uses, proposals will have to achieve:

- An implementation of an EU framework for the collection of data pertinent to bio-based products including disaggregated product-level statistics enabling the systematic monitoring of the evolution of bio-based product markets.
- The development of statistics and modelling tools providing decision-makers with the capacity to monitor bioeconomy developments and formulate clear targets and consider future impacts of present-day decisions, in particular in relation to establishing an efficient strategy for biomass use in the EU. Contribution to interoperability activities (e.g. bioeconomy related models, database interface specifications).
- Demonstrate direct benefits to the bio-based industries in the form of an enhanced capacity to provide evidence of these industries' economic, environmental and social impact in quantitative terms.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BB-03-2017: Adaptive tree breeding strategies and tools for forest production systems resilient to climate change and natural disturbances

Specific Challenge: Climate change and associated natural disturbances will increasingly influence the current distribution and productivity of tree species, within the constraints of physical barriers, long production cycles and regulations on forest reproductive materials. They will also affect the areas in which trees of different species and provenance could grow, or grow better, in the future. Assisted migration of tree species from one region (or continent) to another has contributed to increased wood production in Europe in recent centuries. Though there are examples of good practice and benefits of genetic variation, there is still limited evidence of the inherent genotypic/phenotypic plasticity of tree species and provenances, and their symbionts, to adapt rapidly enough and survive the current pace of environmental change. To counteract climate-induced decline and maintain/enhance forest productivity and meet the growing needs of society and the bioeconomy, we may enhance the resilience of forests through the selection/development of new genotypes, through traditional methods of genome sequencing and selection of desired traits and/or novel methods of genome improvement.

Scope: Proposals should aim to develop novel tree breeding strategies and tools aimed at sustained yields (wood and non-wood products), while addressing resilience to climate change and natural disturbances (including pests and disease outbreaks), and considering biodiversity-related aspects. Proposals will aim to identify/develop genotypes with appropriate adaptation profiles for possible extension/change of tree species range, both vertically and horizontally, including those genotypes with potential for use on marginal land. Coniferous and broadleaved species that are of specific importance for forestry and ecosystem services EU-wide should be targeted. Compliance with biosafety and other relevant legislation (e.g. biodiversity and invasive alien species) should be taken into account. Complementarity with previous (FP7/LIFE) projects and COST actions should also be considered.

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

Expected Impact: To counteract climate change, maintain and enhance forest productivity and the sustainability of forestry systems, proposals should show how some, or all, of the following impacts will be achieved:

- direct technical support for forest managers on the choice of tree species and provenances to increase stress tolerance to underlying environmental change and meet increasing societal demands on forest goods and services;
- better understanding of benefits and risks related to the economic performance of wood-value chains and the environmental effects of the enhanced use of novel biotechnologies.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BB-04-2016: Intelligent solutions and tools in forest production systems, fostering a sustainable supply of quality wood for the growing bioeconomy

Specific Challenge: Increasing societal demands and emerging policies relating to forest resources present new challenges for the sector and trigger the need to enhance the multi-functional role of forests in the EU. The quantity and the quality of wood yields depend on site conditions, forest management objectives, silvicultural regime and measures taken from the establishment of forest stands to the end of rotation (for even-aged forests) or the selection harvest (for uneven-aged forests). Managing forests' horizontal and vertical structure is crucially important given the long production cycles involved and the demand to adapt, within the production cycle, to the evolving framework of environmental and societal conditions. It is therefore desirable to develop intelligent (i.e. cost-efficient, productive and environment-

friendly) and novel solutions and tools to support sustainable wood production from forests managed on a multifunctional basis.

Scope: To add value to wood production and enable close-to-market outputs, proposals should aim to develop a series of cutting edge technologies in relation to forestry measures starting from seedling/replanting, through to harvesting. Activities should aim directly at producing plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication. SMEs active in the forest-based sector are specifically encouraged to participate in consortia.

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

Expected Impact: With a view to enhancing the multifunctional role of forests, proposals should show how some, or all, of the following impacts will be achieved:

- Improved tools for sustainable forest management decisions and operations in primary production systems, marketable within a period of up to three years from the approval, entailing higher efficiency in operation;
- Lower environmental impact of forest management and harvesting operations, in order to preserve forests' capacity to provide for non-wood forest products and essential ecosystem services such as carbon sequestration, biodiversity conservation, water regulation, soil and nutrient regulation, and recreation;
- Sustainable supply of quality wood for the growth of forestry enterprises in the bioeconomy and the creation of new jobs in SMEs..

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CROSS-REFERENCE TO THE RURAL RENAISSANCE CALL

The following topics under the call 'Rural Renaissance' inserted in this Work Programme part are also relevant to the objectives of this area: RUR-6-2016, RUR-7-2016, RUR-8-2017 and RUR-9-2017. For the topic texts and further information please refer to the 'Rural Renaissance' call.

BUILDING THE "BIO-BASED MARKETS OF THE FUTURE"- MOBILISING STAKEHOLDERS ENGAGEMENT

Proposals are invited against the following topic(s):

BB-05-2017: Bio-based products: Mobilisation and mutual learning action plan

Specific Challenge: Ensuring that research and innovation in bio-based products and processes is not only excellent, but also relevant and responsive to the needs of all actors is important, not least in ensuring the uptake of results. Surveys show that consumers and citizens in general have little awareness and knowledge of bio-based products (BBP). To improve market uptake of bio-based products, shape future research in BBP science, technology and innovation and meet the views and expectations of society, there is a need for a broad, inclusive assessment of the challenges and opportunities at hand.

Multi-actor approaches are needed to identify and address both the risks and different stakeholders' interests and aspirations, in order to maximise the benefits of new bio-based business models within society. Mobilisation of all actors along the value chain is crucial to mitigate the probability of "technology mismatches" (i.e. development of technologies without a corresponding reliable and cost-efficient feedstock supply, or which face insufficient market demand).

Scope: The Mobilisation and Mutual Learning Action Plan (MML) should ensure the engagement of all relevant groups and tackle innovation related challenges by establishing a multi-stakeholder platform, gathering a plurality of actors with different perspectives, knowledge and experiences [141], and maintaining open dialogue between the different stakeholders.

The objective of the platform should be the development and implementation of an Action Plan that would address the challenges of raising awareness of and engaging with the citizens on the bio-based products. Proposals have to be based on and develop the concept of Mobilisation & Mutual Learning Platforms (MML). The design of this platform and its activities should take into account and build on methods developed previously in European projects and initiatives (including consultation processes in the field of bio-based products).

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

[141] Involving a balanced representation of experts and professionals in the fields of public engagement and bio-based products in general, and more specifically researchers, civil society (CSOs) and non-governmental organisations (NGOs), scientists in the field of social sciences and humanities, industry and policy-makers.

Expected Impact: The direct and sustainable impact of proposals will be:

- to create networks of specific target groups in order to raise citizens' awareness and understanding of bio-based products;
- to create a better framework for new bio-based market opportunities, through broad stakeholder engagement leading to responsible, reliable, and societally acceptable solutions;
- to contribute to responsible policy-making, helping to shape further research on bio-based products and improving acceptability of existing bio-based products.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BB-06-2016: The regional dimension of bio-based industries

Specific Challenge: Regions may play a key role in the establishment of bio-based industries by providing a favourable business environment and the necessary political framework. Few regions in Europe are in the process of building successful "bio-based industries" demonstrator case studies. Those that do exist are largely in the regions with established industries (chemical, energy, pulp and paper, etc.).

Strategies and implementing modalities should be shared in particular with regions that have as yet unexploited biomass or waste resources so as to widen participation of countries, fully exploit the potentials of the bio-based economy in Europe and contribute to rural and coastal renaissance. Bio-based industries and products offer new opportunities for regional and local actors using alternative resources and maximising possibilities for agricultural, forest and urban waste to be valorised. Development of synergies with the regional innovation strategies for the bio-based economy will boost the competitiveness of the region and its stakeholders on a national, European and international level. Local actors may equally attract investments from other partners for establishing a favourable bio-based "ecosystem".

Scope: Proposals will create a stakeholder platform of regional and local organisations (regional authorities or mandated agencies or clusters) interested in developing ambitious strategies in support of bio-based products/industries, with the aim to attract new investments in industrial projects. Building on the "model demonstrator regions", successful case studies shall be shared and transposed to other interested European regions. Industries, regions and investors should be brought together to establish an efficient dialogue between actors so that demand and supply can be aligned, establishing best practices and examples that can be followed by others.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately.

Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: To widen the participation of countries developing regional bio-based strategies, proposals will have to:

- constitute effective networks of stakeholders – local and industrial- for the implementation of concrete projects along the value chains of products to be used as demonstrators;
- identify new opportunities at regional and local level and define mechanisms, tools, approaches, examples of good practice, guidelines, and further actions that may facilitate joint and/or complementary investments in research and innovation in the field of bio-based products.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Bio-based innovation for sustainable goods and services - Supporting the development of a European Bioeconomy

Opening date(s), deadline(s), indicative budget(s):[142]

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 27 Oct 2015			
BB-04-2016 (IA)	6.00		17 Feb 2016
BB-06-2016 (CSA)	1.00		
BB-01-2016 (RIA)	5.00		17 Feb 2016 (First stage) 13 Sep 2016 (Second stage)
Opening: 04 Oct 2016			
BB-05-2017 (CSA)		3.00	14 Feb 2017
BB-02-2017 (RIA)		6.00	14 Feb 2017 (First stage) 13 Sep 2017 (Second stage)
BB-03-2017 (RIA)		6.00	
Overall indicative budget	12.00	15.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

[142] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
All deadlines are at 17.00.00 Brussels local time.
The Director-General responsible may delay the deadline(s) by up to two months.
The deadline(s) in 2017 are indicative and subject to a separate financing decision for 2017.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide published on the Participant Portal.

Consortium agreement: Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

SME INSTRUMENT

Full details on the continuously open SME instrument call (*H2020-SMEInst-2016-2017*) are provided under the Horizon 2020 Work Programme Part –Innovation in SMEs (Part 7 of this Work Programme).

This Work Programme part contributes the following challenges of the SME instrument calls:

- SMEInst-07-2016-2017

Stimulating the innovation potential of SMEs for sustainable and competitive agriculture, forestry, agri-food and bio-based sectors

Specific Challenge: SMEs can play a crucial role in developing resource-efficient and cost-effective solutions to secure sufficient supplies of safe, healthy and high quality food and other bio-based products, by developing productive, sustainable and resource-efficient primary production systems, fostering related ecosystem services and the recovery of biological diversity, alongside competitive and low-carbon supply, processing and marketing chains. Actions under this topic are expected to contribute to one or a combination of several challenges addressed by Societal Challenge 2 of Horizon 2020 with regard to terrestrial resources (i.e. 2.1 ' Sustainable agriculture and forestry', 2.2 ' Sustainable and competitive agri-food sector for a safe and healthy diet' and 2.4 ' Sustainable and competitive bio-based industries and supporting the development of a European bioeconomy'). Particular attention should be given to:

- Advancing innovations in Integrated Pest Management
- Resource-efficient eco-innovative food production and processing
- Reduction of food losses and waste on farm and along the value-chain
- Creating added value from waste and by-products generated on farm and along the value-chain
- SMEInst-08-2016-2017

Supporting SMEs efforts for the development - deployment and market replication of innovative solutions for blue growth

Specific Challenge: The potential of Europe’s Oceans, seas and coasts is significant for job and growth creation if the appropriate investments in research and innovation are made. SMEs contribution to the development of the 'Blue Growth Strategy' (COM (2012) 494) can be significant in particular in the fields of marine biotechnology, fisheries, marine and fresh water aquaculture (including production and processing of feed and food). However, one of the most important barriers for the development of innovative maritime economic activities is

the lack of access to finance for SMEs to develop high-potential, but high-risk innovative ideas and to bring them close to market. The SME instrument offers financial support to SMEs with an EU dimension to put forward their most innovative ideas in the previously mentioned maritime and aquaculture/fisheries sectors with a particular focus on close-to-market solutions and potential for high growth and internationalisation.

FAST TRACK TO INNOVATION - PILOT

Full details on this pilot are provided in the separate call for proposals under the Horizon 2020 Work Programme Part – Fast Track to Innovation Pilot (Part 18 of this Work Programme)

Other actions[143]

1. Horizon Prize on Food Security

This action calls for the design of one inducement prize in the food security area and for its subsequent implementation. The ultimate objective is to develop innovative and fully tested prototypes (products and/or processes) that can subsequently rapidly enter the commercialisation/market deployment phase. For this prize contest, the prize will be awarded once a pre-defined, and ambitious yet feasible target has been reached. The specific scope and rules of the competition will be provided in the course of 2016.

Type of Action: Prize

The common Rules of Contest for Prizes are provided in part F of the General Annexes.

Indicative budget: EUR 2.00 million from the 2017 budget

2. Specific Grant Agreements (SGAs) for ERA-NET Cofund actions supporting Joint Actions towards Public-Public Partnerships in the Bioeconomy

Once the Framework Partnership Agreement (FPA) resulting from topic SFS-18-2016 is concluded between the Commission and the consortium of programme owners and programme managers, each individual ERA-NET Cofund action will be implemented as a Specific Grant Agreement (SGA) linked to the FPA.

Individual topics suitable for SGAs will be identified and discussed in close collaboration with Member States' representatives through appropriate governance bodies (e.g. SCAR) on the basis of the indicative list of topics below. Additional topics may be included in agreement with the Commission. The actual submission of the simplified ERA-NET Cofund proposals will only be possible after Commission services have agreed to the scope and budget of each ERA-NET to be co-funded.

Applicants are encouraged to implement other joint activities, including additional joint calls without EU co-funding.

Proposals may include additional legal entities, provided that they fulfil the eligibility criteria for ERA-NET Cofund actions and under the condition that they accede to the Framework Partnership Agreement at the time of the signature of the Specific Grant agreement.

[143] The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

Legal entities from international partner countries are encouraged to participate in the joint call as well as in other joint activities. Participants from countries that are not automatically eligible for funding may request a contribution from the EU to cover the costs of coordinating additional activities on the basis of the ERA-NET unit cost.

Proposals will be evaluated by internal experts, in particular to ensure their compliance with the technical and legal requirements for ERA-NET Cofund actions and their overall excellence, before the grant is prepared.

The time from proposal submission to signature of the grant agreement should not normally exceed 4-5 months, and should thus contribute to faster launch of joint calls and implementation of actions. Proposals may not be submitted later than 31 October of the budgetary year.

Proposals should address one or more of the following issues (A) to (E) and should clearly state which one. Nonetheless, this does not preclude the submission of proposals on other topics, by prior agreement with the Commission services.

A. Sustainable crop production

Scope: To pool resources and know-how to develop and test solutions for sustainable crop production, including areas such as breeding, nutrient recycling and soil-plant-atmosphere interactions, plant health and protection, management practices and the added value of agricultural products.

Expected Impact: Activities will contribute to developing cropping systems with improved performance in terms of reduced environmental impacts, resource-use efficiency and product quality. This will help the farming sector adapt to changes expected to result e.g. from emerging resource scarcity, environmental variation, demography, consumer preferences, and global trade.

B. Innovative forest-based bioeconomy

Scope: Forests cover more than 40 % of the EU's landmass and are instrumental in a number of key policy areas. The forest-based sector provides income for 16 million owners, supports 3-4 million jobs in rural areas, represents some 8% of the EU's total manufacturing value; removes the equivalent of approximately 9 % of greenhouse gases emitted by other parts of the economy; and provides for a wide range of other social, economic and ecological services. The proposed Cofund action will promote increased innovation and competitiveness of the forest-based sector in Europe and support its transformation from a resource-intensive to a knowledge-intensive, productive, resource-efficient and resilient sector. Sustainability and modernisation of forestry systems and downstream value chains including innovative business concepts and production technologies will be needed to develop the forestry sector and the European bioeconomy, of which forestry accounts for a large share. Basic and applied

research, close-to-market research and innovation actions are all envisaged. The scope spans all forest-based value chains, from forest vitality and sustainability of forestry production systems to efficiency in supplying forest-based goods (wood and non-wood) and services.

Expected Impact: Enhanced resilience of forest ecosystems and forestry production systems to natural disturbances (including pests and diseases), connected to watershed and landscape management; sustainable provision of forest biomass for the European bioeconomy, ecosystem services and non-wood forest products; development of new sustainable and resource-efficient value chains and consolidation of the existing ones; development of new knowledge and processes to support major transitions and innovations in the forest-based sector, supporting business development in rural areas and industrial development, in crucial sectors such as forest-based industries (traditional and emerging branches), construction, transport and energy; increased resource efficiency (e.g. water, energy) and climate change mitigation (carbon sequestration in forest and wood-based products); and contribution to the implementation of key EU policy areas such as rural development, biodiversity, climate change, industrial policy, circular economy and bioeconomy.

C. GMO research

Scope: The ERA-NET will coordinate transnational research on the effects of genetically modified organisms (GMOs) in the areas of human and animal health, the environment, techno- economics and societies. The focus of the ERA-NET will be on GMOs intentionally released into the environment and/or used immediately in feed and food applications. In addition, the ERA-NET will explicitly take into account the wider views of a range of stakeholders and end-users (e.g. non-governmental organisations, industry, and farmers). This is intended to strengthen ownership of the ERA-NET among stakeholders in order to encourage participation by different scientific communities in future joint transnational calls, to enhance collaboration and to increase the accountability of research trajectories and outcomes. There is a need to better and more openly communicate all societally relevant issues associated with GMOs in order to formulate a more diverse and open view, taking into account both benefits and risks. This will allow people to make an informed choice about whether and how biotechnologies can be used to deliver solutions to current and future challenges in agriculture and other areas. The ERA-NET will build on the results of the CSA project “Preparatory steps towards a GMO research ERA-NET”. The work is expected to benefit from contribution of social sciences and to apply a 'gender approach'.

Expected Impact: The overall goal of EU science, development, innovation and agricultural policies is to increase the sustainability and efficiency of agricultural production, leveraging the potential for the implementation of the future bioeconomy, for the greening of agriculture, and for mitigation and adapting to climate change. Therefore, these goals are taken as a benchmark in assessing the nature and magnitude of the possible effects of GMOs and their contribution to these goals and in informing decision-making on how these can be scientifically addressed in a meaningful way. ERA-NET projects will also deliver more meaningful results that can inform both regulatory and political decisions better than the

present uncoordinated research structure, in order to protect the environment, human and animal health, and valued socio-economic conditions (e.g. the structure of rural communities, power sharing among different actors in the value chain). The proposed implementation plan will also safeguard the possibility of using GMOs for the benefit of society (e.g. by increasing the sustainability of agricultural systems, protecting biodiversity by replacing current practices that have large negative footprints, and enhancing animal welfare and people's livelihoods in rural communities).

D. Nutrition and the epigenome

Scope: Genome-wide association studies have yielded a wealth of information on human genetic heterogeneity, with literally hundreds of alleles found that define a susceptibility to lifestyle-dependent diseases in the context of diet. However, it has become obvious that information on dietary exposure and genotype alone is insufficient to define the phenotype or provide causal relationships. There is thus an urgent need to gain a better understanding of additional factors that contribute to the phenotype and this refers to metabolic imprinting processes, including epigenetic effects. There can be no doubt that during critical periods of human development such as embryonic, foetal, and early postnatal life, nutrition has pronounced effects that have long-lasting or lifelong effects for example on mechanisms that control body weight and/or predisposition to diseases later in life. Although it is believed that this 'metabolic programming' is mainly via epigenetic processes it is not clear whether any epigenetic dysregulation is indeed a major cause of human obesity. Moreover, it seems necessary to assess whether not only energy balance and other metabolic parameters are altered but also to what extent and magnitude for example food preferences and other food intake behaviours are determined via such mechanisms. There is also a need to clarify where – in which cells or tissues – these imprinting effects take place and how, out of these routes, lifelong or even trans-generational alterations can occur. This work is expected to benefit from the contribution of social sciences and to apply a 'gender approach'.

Expected Impact: An ERA-NET in this area would provide the required investment to fully take the opportunity for better understanding of the diet-genome and diet-epigenome and imprinting relationship. This investment will build on existing capacity within some of the Member States and provide opportunities to develop capacity in others, positioning the countries involved in the JPI HDHL at the forefront of this research area.

E. Plant Molecular Factory

Scope:

Plant Molecular Factory is defined as the use of plants or plant cells to produce high-value products such as proteins, peptides and metabolites, particularly for pharmaceutical and medical/veterinary, diagnostic, agricultural and industrial applications, including strategies to engineer plants to allow better processing of biomass into such high-value products. The specific challenge consists in increasing the availability to end users, lowering the cost of end products by scaling up efficient manufacturing and purification process, shortening

production cycles and achieving high product yield. For the successful implementation market related issues such as regulatory compliance and approval, public acceptance and engagement need to be fully addressed. National and regional research programmes in this area are currently fragmented. Based on the necessary critical mass, an ERA-NET Cofund project will aim at mobilising national resources in the coordination and alignment of national programmes and activities in the field.

Activities should also aim at improved collaboration and alignment of national programmes and activities and will provide concrete plans to reduce fragmentation, for data sharing, for promotion of common data elements for the establishment of patent registries, to address hurdles in the way of effective coordination, to involve stakeholders and relevant existing initiatives. Activities should consider and may build on previous EU-funded initiatives and projects in the field (e.g. COST Action FA804, projects PlantaPharma, Comofarm, PLAPROVA, Smartcell).

ERA-NET project should consider implementing other joint activities including additional joint calls without EU co-funding, building on previous experience and avoiding overlaps with other initiatives, support mutual learning and training, comply with regulatory issues, exchange good practice, and promote researcher mobility and equal opportunities for female and male researchers (e.g. through EURAXESS) and better careers in the field. The ERA-NET project should consider the establishment of a pan-European network of funding agencies and other key players in Europe under the condition that it is not at the expense of the success of the joint call.

The Commission considers that proposals requesting a contribution from the EU of an indicative amount of 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:

- Effective trans-national, pan-European research networking and synergies among national/regional and EU research programmes in the area of plant molecular factory.
- Turning the opportunity demonstrated at research scale into full-scale adoption, to allow the technology to become mature and fully economically competitive. This will be achieved by focusing on end products with high value and by ensuring early industrial engagement.
- Creating new opportunities for European bioindustries by increasing the range of natural bioactive compounds for the end product development.
- Effective integration of research community, agriculture, bioprocessing industry and end user representative groups.

- Clear benefit to bioproduct end users due to improved safety and economic parameters.

Legal entities: Signatories of the Framework Partnership Agreement (SFS -18-2016).

Type of Action: Specific Grant Agreement

for ERA-NET Cofund actions under the Framework Partnership Agreement resulting from SFS-18-2016.

This action is connected to the 2016 Framework Partnership Agreement supporting Joint Actions towards Public-Public Partnerships in the Bioeconomy.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: Third quarter of 2017.

Indicative budget: EUR 25.07 million from the 2017 budget

3. Bioeconomy Knowledge Centre

Specific Challenge: The development of an improved system of strategic intelligence is needed to help identifying and developing new promising Bioeconomy value chains.

Scope: The Bioeoconomy Knowledge Centre will present both the state of advancement and the results of a systematic policy-watch, market-watch and science and technology-watch as well as of foresight exercises and of assessments potential impacts of legislation. Research activities performed in the framework of the action should include the use and/or development of state of the art methodologies for data retrieval and/or gathering and/or simulations as well as for foresight tools and for modelling future impacts. Special attention will be paid to present and analyse market developments, National Bioeconomy strategies, Regional Smart specialisation strategies, skills availability and future requirements, infrastructures, services, etc.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 2016

Indicative budget: EUR 1.50 million from the 2016 budget

4. Support to Research and Innovation Policy in the area of bio-based products and services

The objective is to provide high quality external expertise to ensure objectivity and high-level technical service to support the design and preparation of Union policy initiatives and legislative and programme proposals relevant for the Bio-based products and services

Research and Innovation. The required service is in the area of policy analysis and technical assistance and will be delivered in the form of studies.

Type of Action: Public Procurement - One new direct contract

Indicative timetable: 1st quarter of 2016

Indicative budget: EUR 2.00 million from the 2016 budget

5. Linking bioeconomy research activities with regional and macro-regional policies

The objective is to provide with high quality external expertise to support the design and preparation of Union policy initiatives that link Bioeconomy Research and Innovation with the regional and macro-regional policies and strategies. The required service is in the area of policy analysis and technical assistance and will be delivered in the form of a study.

Type of Action: Public Procurement - Using an existing framework contract - One specific contract

Indicative timetable: 1st quarter of 2016

Indicative budget: EUR 0.15 million from the 2016 budget

6. Final evaluation of the Joint Baltic Sea research and development programme (BONUS)

Specific Challenge & Scope: A Final Evaluation of the Joint Baltic Sea research and development programme (BONUS) is required by decision of the European Parliament and Council 862/2010/EU to be undertaken no later than 31st December 2017. This evaluation will assess the progress of BONUS towards achieving the objectives set out in Article 2 and Annex 1 of this decision. A group of external experts will be established to provide this analysis.

A special allowance of EUR 450/day will be paid to the experts appointed in their personal capacity who act independently and in the public interest.

Type of Action: Expert Contracts

Indicative timetable: Fourth quarter of 2016 until end of 2017

Indicative budget: EUR 0.15 million from the 2016 budget

7. Independent reviewers on the interim evaluation of H2020

Specific Challenge & Scope: A group of independent reviewers will be set up to carry out the interim evaluation of Horizon 2020 for SC2. The group will also look into the achievements of FP7 projects with a view to identifying the long term impact of the EU Framework

Programmes. The composition of the group will reflect the need for a mix of skills and competences. The experts will be selected on the basis of objective criteria.

A special allowance of EUR 450/day will be paid to the experts appointed in their personal capacity who act independently and in the public interest.

Type of Action: Expert Contracts

Indicative timetable: 2016-2017

Indicative budget: EUR 0.40 million from the 2016 budget

8. Bioeconomy Stakeholders' Conference

In support of the implementation of the Strategy "Innovating for Sustainable Growth: a Bioeconomy for Europe", a Bioeconomy Stakeholders' Conference should provide opportunities for public awareness raising and for an informed dialogue on the progress of the bioeconomy, involving researchers, stakeholders, policy makers and the civil society at large across the whole bioeconomy value chain. The Conference should address in particular the importance of aligning all stakeholders around the creation of new markets and boosting investments in the bioeconomy, to deliver jobs and inclusive, sustainable economic growth. The organisation of such a Conference should build on efforts undertaken in this direction by the European Commission and the Netherlands Presidency of the Council of the EU.

Legal entities:
Ministerie van Economische Zaken / RVO (rijksdienst voor ondernemend Nederland), Prinses Beatrixlaan 2 2595 AL, Den Haag, Nederland

Type of Action: Grant to identified beneficiary - Coordination and support actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: First half 2016

Indicative budget: EUR 0.10 million from the 2016 budget

9. Review of the Bioeconomy strategy

A group of independent reviewers will be set up to review the Bioeconomy Strategy and its Action Plan. The group will assess the strategy, projects and actions implemented and their achievements so far, and propose future actions. The composition of the group will reflect the need for a mix of skills and competences. The experts will be selected on the basis of objective criteria.

A special allowance of EUR 450/day will be paid to the experts appointed in their personal capacity who act independently and in the public interest.

Type of Action: Expert Contracts

Indicative timetable: 2016

Indicative budget: EUR 0.20 million from the 2016 budget

10. External expertise

This action will support the use of appointed independent experts for the monitoring and review of running projects, as well as for the evaluation of entries submitted to prize contests.

Type of Action: Expert Contracts

Indicative timetable: 2016-2017

Indicative budget: EUR 0.66 million from the 2016 budget and EUR 0.71 million from the 2017 budget

Budget[144]

	Budget line(s)	2016 Budget (EUR million)	2017 Budget (EUR million)
Calls			
H2020-SFS-2016-2017		180.50	234.00[145]
	from 05.090301	*118.00*	*164.00*
	from 08.020302	*62.50*	*70.00*
H2020-BG-2016-2017		39.00[146]	29.00[147]
	from 08.020302	*39.00*	*29.00*
H2020-RUR-2016-2017		66.00	62.00
	from 05.090301	*66.00*	*54.00*
	from 08.020302		*8.00*
H2020-BB-2016-2017		12.00	15.00
	from 08.020302	*12.00*	*15.00*

[144] The budget figures given in this table are rounded to two decimal places.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

[145] To which EUR 10.00 million from part 12 (budget line 08.020305) and EUR 7.00 million from part 5.i (budget line 09.040201) will be added making a total of EUR 251.00 million for this call

[146] To which EUR 2.00 million from part 5.ii (budget line 08.020201) and EUR 2.00 million from part 10 (budget line 08.020303) and EUR 9.00 million from part 11 (budget line 08.020304) and EUR 30.00 million from part 12 (budget line 08.020305) will be added making a total of EUR 82.00 million for this call

[147] To which EUR 8.00 million from part 11 (budget line 08.020304) and EUR 10.00 million from part 12 (budget line 08.020305) will be added making a total of EUR 47.00 million for this call

Contribution from this part to call H2020-FTIPilot-2016 under Part 18 of the work programme		8.90	
	from 05.090301	*3.86*	
	from 08.020302	*5.04*	
Contribution from this part to call H2020-IND-CE-2016/17 under Part 17 of the work programme		3.00	
	from 08.020302	*3.00*	
Contribution from this part to call H2020-IOT-2016-2017 under Part 17 of the work programme		15.00	
	from 05.090301	*15.00*	
Contribution from this part to call H2020-SMEInst-2016-2017 under Part 7 of the work programme		34.96	42.28
	from 05.090301	*15.81*	*16.03*
	from 08.020302	*19.15*	*26.25*
Other actions			
Prize			2.00
	from 08.020302		*2.00*
Expert Contracts		1.41	0.71
	from 05.090301	*0.13*	*0.09*
	from 08.020302	*1.28*	*0.61*
Grant to Identified beneficiary		0.10	
	from 08.020302	*0.10*	
Provision of		1.50	

technical/scientific services by the Joint Research Centre	*from 08.020302*	*1.50*	
Public Procurement		2.15	
	from 08.020302	*2.15*	
Specific Grant Agreement			25.07
	from 08.020302		*25.07*
Estimated total budget		**364.52**	**410.06**