

EN

ANNEX 12

HORIZON 2020

WORK PROGRAMME 2016 – 2017

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

Table of contents

Introduction	8
Call for Sustainable Food Security – Resilient and resource-efficient value chains.....	9
Implementation of the EU-China FAB Flagship initiative	10
SFS - 1. A joint plant breeding programme to decrease dependency of the EU and China on protein imports	10
SFS - 2. – EU-China cooperation in the field of food safety, authentication and traceability of agro-food products	10
SFS - 3. - Soil water resources management in the EU and China and its impact on agro-ecosystem functions	11
<i>More resilient and resource efficient value chains</i>	<i>11</i>
SFS - 4. [2016]: Dealing with multiple and combined stresses: approaches to improve water and nutrient use efficiency in crop production.....	11
SFS - 5. [2016] Teaming up for good: Associations and mixtures as drivers of productivity and resilience in cropping systems.....	12
SFS - 6. [2016] Testing and breeding for sustainability and resilience in crops.....	12
SFS - 7. [2017] New partnerships and tools to enhance European capacities for in-situ conservation	13
SFS - 8. [2016]: Robotics Advances for Precision Farming	13
SFS - 9. [2016]: WEEDING - Strategies, tools and technologies for sustainable weed management	14
SFS - 10. [2016/2017]: Organic Breeding – Increasing the competitiveness of the organic breeding and farming sector.....	14
SFS - 11. [2017]: Organic Inputs – Critical inputs in organic farming.....	15
SFS - 12. [2016/2017] Controlling outbreak of emerging diseases:	15
A. [2016] The case of <i>Xylella fastidiosa</i>	15
SFS - 13. [2016/2017] Advancing innovations in Integrated Pest Management - a role for SMEs.....	15
SFS - 14. [2016/2017] Challenges for disease management: Perennial crops in the tropics and sub-tropics.....	16
SFS - 15. [2016]: Support for international research on animal health.....	16
SFS - 16. [2016]: Validation of diagnostic tools for Animal Health	17
SFS - 17. -[2016]: Understanding Host-Pathogen Interactions.....	17
SFS - 18. [2017]: Breeding multipurpose livestock for resilience and efficiency	18

HORIZON 2020 – WORK PROGRAMME 2016-2017

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

SFS - 19.	[2017]: Bee health.....	18
SFS - 20.	[2017]: Pesticides.....	19
SFS - 21.	[XX]: Support to the implementation of the EU-Africa partnership on Food and Nutrition Security and Sustainable Agriculture	19
SFS - 22.	[2017]: support to the implementation of the EU-Mediterranean partnership on food systems and water resources (PRIMA)	19
SFS - 23.	[2016/2017] ERANET COFUND: Public-Public Partnerships in the bioeconomy.....	20
SFS - 24.	[2016/2017]: Towards an integrated and effective regional fisheries management.....	23
SFS - 25.	[2017]: Advancing basic biological knowledge on commercially important fish species ...	24
SFS - 26.	[2017]: Smart fisheries technologies.....	24
SFS - 27.	[2016]: Improving technical performance of the Mediterranean fish farming sector (including molluscs).....	24
SFS - 28.	[2016-]: Reinforcing EU-ASEAN international cooperation on sustainable intensification of aquaculture	25
SFS - 29.	[2016] SCAR Support Action	25
<i>Environment-smart and climate-smart primary production.....</i>		26
SFS - 30.	[2016]: LEGUMES - Transition paths to sustainable legume-based cropping systems and agri-feed and food chains.	26
SFS - 31.	[2017]: Permanent grassland – farming systems and policies.....	26
SFS - 32.	[2016]: Soil-based ecosystem services and innovations	27
SFS - 33.	[2017]: Functional Biodiversity – Productivity gains through functional biodiversity – effective crop pollinators and pest predators interplay	27
SFS - 34.	[2017]: Socio-Eco-Economics – Socio economics in ecological approaches.....	28
SFS - 35.	[2017]: Closing loops at farm and regional levels to mitigate climate GHG: focus on carbon and nitrogen cycling in agro ecosystems.....	28
SFS - 36.	[2017] – Farming for tomorrow: developing an enabling environment for resilient and sustainable agricultural systems	29
SFS - 37.	[2016-2017]: Promoting and supporting innovation in aquaculture production systems: eco-intensification inland (including fresh water), coastal zone and offshore.....	29
<i>A competitive food industry.....</i>		30
SFS - 38.	[2016]: Shaping sustainable and resilient agro-food systems: understanding value chain dynamics	30

HORIZON 2020 – WORK PROGRAMME 2016-2017

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

SFS - 39.	[2016]: Unlocking the competitiveness and sustainability potential of agro-food value chains.....	30
SFS - 40.	[2017]: Reducing food losses along the value chains	31
SFS - 41.	[2016] PACK: Innovative solutions for sustainable food packaging.....	31
Type of action: IA		32
SFS - 42.	[2017] NATURAL: Natural Foods and Clean Labels.....	32
Type of action: IA		32
SFS - 43.	[2016/2017] FOODSMES: Resource-efficient eco-innovative food production and processing.....	32
<i>Healthy and safe foods and diets for all.....</i>		33
SFS - 44.	[2017]: Co-fund on "One Health" (zoonoses – emerging threats)	33
SFS - 45.	[2016] HEALTHKID: Encouraging healthy dietary choices in childhood and measuring its impact on health	34
SFS - 46.	[2017] FOODRISK: The impact of consumer practices in biological and chemical food safety risks and mitigation strategies	34
SFS - 47.	[2016] IMPULSE: Impulsivity and compulsivity and the link to nutrition, lifestyle and the socio-economic environment	35
SFS - 48.	[2017] OBESITY: How to tackle the obesity epidemic?	35
SFS - 49.	[2017] SWEET: Sweeteners and sweetness enhancers.....	36
Call for Blue Growth - Demonstrating an ocean of opportunities		37
<i>Innovation for emerging Blue Growth activities</i>		38
BG - 1.	[2016]: Large-scale integrated algae biorefineries.....	38
BG - 2.	[2016/2017]: High value-added specialised vessel concepts enabling more efficient servicing of emerging coastal and offshore activities	38
BG - 3.	[2016]: Multi-use of the oceans marine space: compatibility, regulations, environmental and legal issues.....	38
BG - 4.	[2017]: Multi-use of the oceans marine space, offshore and near-shore: Technological Barriers.....	39
BG - 5.	[2017]: ERANET COFUND on marine technologies.....	39
<i>Healthy oceans and seas for healthy people</i>		40
BG - 6.	[2017]: Effectively managing the interaction between humans and the oceans and seas: factors impacting healthcare and wellbeing.	40
BG - 7.	[2016/2017]: Blue green innovation for clean coasts and seas	40

HORIZON 2020 – WORK PROGRAMME 2016-2017

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

BG - 8.	[2016]: Innovative sustainable processing solutions for improving the safety and dietary properties of fish and seafood	40
<i>Strengthening the European ocean observing, surveying and monitoring capability.....</i>		41
BG - 9.	[2016]: Integrated Arctic Observing System.....	41
BG - 10.	[2016]: Impact of Arctic changes on weather/climate of northern hemisphere	41
BG - 11.	[2017]: Climate impacts on Arctic ecosystems, resources, new economic activities	42
BG - 12.	[2016]: Improve observing systems and operational oceanography capacities in the Mediterranean	42
<i>Horizontal Activities in Blue Growth Call</i>		42
BG - 13.	[2016]: Support to the Blue Med Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean	42
BG - 14.	[2016-2017]: Supporting SMEs efforts for the development - deployment and market replication of innovative solutions for blue growth	43
Call for a Rural Renaissance - Fostering innovation and business opportunities		44
<i>New approaches towards policies and governance</i>		45
RR - 1.	[2017]: Towards 2030: policies and decision tools for an integrated management of natural resources.....	46
RR - 2.	[2016]: WATER FARMS – Improving farming and supply of drinking water.....	46
RR - 3.	[2017] ECOSYSTEM: Novel public policies and business models for sustainable supply and payment of forest ecosystem services	47
<i>New value chains and business models</i>		47
RR - 4.	[2016] Crop diversification systems for the delivery of food, feed, industrial products and ecosystems services: from farm benefits to value-chain organisation.....	47
RR - 5.	[2017] Resource-efficient and profitable industrial crops on marginal lands	48
RR - 6.	[2016] Demonstration of integrated logistics centres for food and non-food applications ..	48
RR - 7.	[2016/17] Creating added value from waste and by-products generated on farm and along the value-chain	49
RR - 8.	[2017] – Business models for modern rural economies	49
<i>Innovation and skill development</i>		50
RR - 9.	[2016-2017] – Thematic Networks compiling knowledge ready for practice	50
RR - 10.	[2016]: Mapping, describing and building links between open commercial farms	51
RR - 11.	[2016/2017]: Benchmarking sustainable farming systems: a role for farm networks.....	51

HORIZON 2020 – WORK PROGRAMME 2016-2017

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

RR - 12.	[2017]: Networks of demonstration farms on specific themes.....	52
RR - 13.	[2017] – Future-proofing the agriculture and rural science and education system	53
RR - 14.	[2016/2017]: Advisor's role in functioning of AKIS and advisory policies boosting innovation in sustainable agriculture.....	53
RR - 15.	[2017]: The benefits of working with others – fostering social capital in the farming sector	54
RR - 16.	[2017]: Optimising interactive innovation project approaches and the delivery of EU policies to speed up innovation in rural areas	54

Call for the Bioeconomy - Bio-based innovation for sustainable goods and services 56

Securing sustainable biomass supply for bio-based goods and services57

BE - 1.	[2016] Sustainability schemes for the bio-based economy	57
BE - 2.	[2017] Towards a methodology for the collection of statistical data on bio-based industries and bio-based products	57
BE - 3.	[2017] Plant Molecular Factory	58
BE - 4.	[2016] WOOD: Intelligent solutions and tools in forest production systems, fostering sustainable supply of quality wood for the growing bioeconomy.....	58
BE - 5.	[2017] BREED: Adaptive tree breeding strategies and tools for forest production systems resilient to climate change and natural disturbances	59

Building the "bio-based markets of the future"- mobilising stakeholders engagement 60

BE - 6.	[2016] Bio-based products: Mobilisation and mutual learning action plan	60
BE - 7.	[2017] Public procurement for Innovative Bio-based products	60
BE - 8.	[2017] Bio-based industries regional dimension.....	61
BE - 9.	[2016] LIFECYCLE: Life-cycle analysis of wood value chains and applications for the bioeconomy	61

Other actions (not subject to calls for proposals)..... 63

OTHER - 1.	[2016]: Bioeconomy Knowledge Centre	63
OTHER - 2.	[2016/2017]: Group on independent experts on Bio-based products – EU Future policy and regulatory needs/barriers of innovative bio-based products	63
OTHER - 3.	[2016]: Final evaluation of the Joint Baltic Sea research and development programme (BONUS)	63
OTHER - 4.	[2016/2017]: Bioeconomy and Blue Economy Window (BioBlueWindow).....	64
OTHER - 5.	[2016/2017]: Inducement Prize on Food Security	64
OTHER - 6.	[2016]: Expert group on the interim evaluation of H2020.....	64

HORIZON 2020 – WORK PROGRAMME 2016-2017

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

Contributions of SC 2 to other parts of Horizon 2020.....	65
LEIT-ICT [2016]: Data driven agri-food chains	65
Smart Cities-[2017] Resource-efficient urban agriculture for multiple benefits.....	65
Circular economy [2016] Unlocking the potential of organic waste on urban environments.....	66

Introduction

To be completed

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

H2020-SFS-2016/2017

There are major systemic risks to the supply and quality of food and animal feed, from both terrestrial and aquatic origin. These have direct impacts on the daily access to sufficient, safe and nutritious food¹, on health and well-being of citizens as well as on the environment. Related risks arise from climate change, natural hazards, energy and resource scarcity, inappropriate agricultural and fishing practices, marine and terrestrial pollution, plant and animal diseases, unsustainable manufacturing technologies, food waste, population growth, demographic changes and unsustainable dietary patterns. There is consensus about the urgent need to put in place adaptive measures to better understand and limit risks and environmental impacts, better cope with fluctuating conditions and seize opportunities for new ways of production and consumption. Research and innovation play a critical role in ensuring the food and nutritional security of EU citizens and globally.

Compared to the 2014-2015 Work Programme, the SFS Focus Area is increasing its emphasis on resilience in primary production and in the related food and feed industries. It is also giving more visibility to sustainable and healthy consumption and lifestyles and has been aligned to contribute to the new Commission's agenda and supporting relevant EU policies².

Within this focus area, four sub-areas have been identified:

- 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

This Focus Area has particular relevance for international cooperation, as the EU has leading expertise in sustainable food production and the access and use of resources of truly transnational concerns. 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 Asian countries (on aquaculture).

¹ 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." (World Food Summit 1996)

² Actions in the Focus Area will support the EU approach towards food security; 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 the EU Health and Consumer Policy.

Corresponding to these four sub-areas, proposals are invited against the following topics:

Implementation of the EU-China FAB Flagship initiative

SFS - 1. A joint plant breeding programme to decrease dependency of the EU and China on protein imports

Specific challenge: Legume crops are a critical source of plant-based proteins for people as well as for animals. However, research has been given little priority so far by the public as by the private sector. The EU and China are facing a similar challenge as both regions are protein-deficient and are increasingly dependent on protein imports mainly for animal feed purposes. In recent years (mainly due to its continuous growth of population and urbanisation), soybean imports of China have increased very fast, reaching 60 million tons 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 create price distortions in the near future if imports are going to increase, as indicated by most recent long-term projections. The EU and China have therefore a common interest to cooperate on long-term strategies to develop sustainable alternatives to protein imports with a view to decrease their dependency and contribute to stabilising world market.

Scope: proposals will develop efficient long-term breeding strategies for increasing diversification, crop yield potential and stability as well as protein quality of legume crops. Opening the currently available genetic base for breeding purposes (characterisation) and exchanging novel genetic resources material between the EU and China by providing mutual access to gene banks through open databases will be explored. Proposals will have to test plant performance (phenotyping) in a wide range of geographical (climatic) and environmental situations both in the EU and China in a context of climate change and resistance of biotic and abiotic stresses. Proposals will make use of the wide range of available and promising future technologies both in the EU and China as well as traditional breeding methods.

Type of action: RIA

SFS - 2. – EU-China cooperation in the field of food safety, authentication and traceability of agro-food products

Specific challenge: In recent years, the EU-China trade relations are growing very fast and the agricultural sector has become an important sector both for imports from and exports to China (3 billion euros in 2003 to 11 billion euros in 2013). However, many barriers to trade relations related to safety issues, standardisation and traceability (including fraud) in agro-food products still exist. In addition, there is a need to contribute to the prevention of major food safety crisis along the whole food chain, to meet consumers' expectations for international standards and ensure authenticity of high quality products such as Geographical Indications.

Scope: The topic will look at how to develop more institutionalised cooperation based on science between key laboratories and regulatory authorities in both regions with a view to assure the integrity of the whole food chain, develop mutually recognised standards, increase consumers' confidence, reduce health impacts and establish better economic interaction between both regions. It will eventually provide investment and growth opportunities for the

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

EU industry in key agricultural sectors as well as contribute to a safer whole agro-food chain in Chinese production.

Type of action: RIA

Note: EU experts' workshop to take place on 23/3/2015

SFS - 3. - Soil water resources management in the EU and China and its impact on agro-ecosystem functions

Challenge: Soil is the largest terrestrial water reservoir and crop yield variability is a function of soil hydraulic properties and nutrient input and therefore plays an important role in food and environmental security. The lack of water to sustain crop production systems and other agro-ecosystem services is already a major issue in many Mediterranean areas of the EU and climatic predictions suggest that there will be increased variability and unreliability of precipitation in most areas of the EU. As China is facing similar problems in many parts of the country, there is a common interest to increase cooperation on this key issue to promote sustainable production systems in a changing environment. [The topic will build on the report prepared by the Sino-EU Panel on Land and Soil "Threats to the soil resources base of food security in China and Europe].

Scope: Proposals will assess this function by linking data and models obtained on long-term experiments and integrated them in a system approach by considering regional climate scenarios in Europe and China. Linkages between soil hydrology and soil threats will have to be systematically assessed and mitigation methods provided, taking into account economic context and social aspects of soil water management. Best case practices will be developed for soil water management (conventional and advanced technologies).

Type of action: RIA

More resilient and resource efficient value chains

SFS - 4. [2016]: Dealing with multiple and combined stresses: approaches to improve water and nutrient use efficiency in crop production

Specific Challenge: Water and nutrients are main determinants of plant growth and crop productivity. Against scenarios of increased variability and scarcity of these inputs mutual improvements in water (WUE) and nutrient use efficiency (NUE) are of particular importance for both plant breeding and crop management. Equally, issues of yield stability under variable levels of water and nutrient supply are receiving increased attention.

Scope: Proposals will set the scene for a better understanding of determinants, dynamics and mechanisms of efficient water and nutrient capture, partitioning and use and relate these basic processes to overall system resource use efficiency in plants and crops. In doing so, work will address complex interactions between plants/roots, soils and resource uptake (taking into

account plant responses to combined water and nutrient limitations) as well between genetics, management and the environment. Findings will serve to develop strategies and tools for breeding as well as benefit soil and crop management.

Type of action: RIA

SFS - 5. [2016] Teaming up for good: Associations and mixtures as drivers of productivity and resilience in cropping systems

Specific Challenge: Diversity is recognised as a key element for adaptation of crops to more variable environments (including climate and management, e.g. through more limited resource input). In this context increasing attention is given to associations/mixtures of species and to their potential for stabilising yields and reducing losses caused by plant diseases. Mixtures of cereals for example have shown good potential for managing disease and insect outbreaks, increasing protein levels and controlling weeds. In horticulture, specific crops with pest repellent properties are used in combination with crops which are more susceptible to these pests. There is a need to better understand synergistic plant/crop interactions and how these can be used more systematically in breeding and management practices.

Scope: Activities will further elucidate the mechanisms (biological; ecological, biochemical, physical) underlying beneficial plant interactions in cropping systems to gain more insight into the complex dynamics between plants and their biotic/abiotic environment with regard to resource competition (e.g. nutrients, water, light), facilitation, disease restriction and weed suppression. This knowledge - addressing various types of associations, agronomic systems and pedo-climatic zones in Europe - will feed into strategies and tools for breeding and management. Selected projects will closely liaise with complementary activities funded in response to topic on crop diversification systems under the Rural Renaissance call.

Type of action: RIA

SFS - 6. [2016] Testing and breeding for sustainability and resilience in crops

Specific Challenge: Increasing resource use efficiency and reducing dependency on external inputs is a major challenge in agriculture. Breeding activities need to consider more systematically traits and trait combinations which contribute to a more sustainable and resilient performance of crops cultivated in a range of environments and agro-ecological conditions. Criteria, testing methods and trials for registration of new varieties need to further evolve to better capture the "sustainability profile" of new varieties.

Scope: Activities will help to identify "sustainability traits" and develop methodologies and tools to integrate sustainability criteria into variety testing and registration. Availability of more reliable/robust testing methods will allow for more harmonised approaches in European plant variety registration and support introduction of plant properties that meet new challenges and demands.

Type of action: RIA

SFS - 7. [2017] New partnerships and tools to enhance European capacities for in-situ conservation

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

Scope: Activities will help to build (a) network(s) of in-situ conservation sites (including on-farms and on-gardens) and actors. New partnerships between the conservation, farming, gardening and breeding sectors as well as the wider public will allow building longer term capacities to manage genetic resources in more dynamic ways and to support their use in breeding, farming and the food chain. Activities will furthermore contribute to developing and showcasing strategies for in-situ conservation and propose measures to better link and exploit synergies between ex-situ and in-situ conservation efforts. While targeting in particular European capacities, projects are encouraged to draw on good examples from outside Europe.

Type of action: CSA

SFS - 8. [2016]: Robotics Advances for Precision Farming

Specific Challenge: Robots can gather operational data on a broader basis than human-operated devices. However there is currently insufficient cross-over between emerging generic advances in field robotics and the more specific, adapted needs of the modern farming community. This action aims to address this problem by combining R&D&I in robotics technologies and agriculture, taking as a promising priority case the agricultural domain of precision farming. The strategic objective should be to make agricultural robotics more adaptable, efficient and robust and to make their usage more affordable.

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

Type of action: RIA – financed by LEIT ICT

SFS - 9. [2016]: WEEDING - Strategies, tools and technologies for sustainable weed management

Specific Challenge: The use of herbicides represents more than one third of the use of pesticides in Europe. Within the objective of the Sustainable Use of Pesticides Directive, weed management occupies a central position in farmed ecosystems. To limit or to avoid the use of herbicides, alternatives are necessary. Approaches ranging from prevention strategies to mechanical engineering could be developed in an integrated approach. The acceptance of farmers to adopt new weed management strategies is a particular challenge due to their risk tolerance and perceptions of weeds and seed bank impact year after year in the farming systems.

Scope: Different systems will be considered: arable crops, horticulture, orchards and vineyards but also grassland. Coverage of both conventional and organic sectors is expected. Development and validation of novel and innovative strategies, tools and technologies in order to manage weeds are expected. Experiments and analysis of practices should be complemented by activities promoting participatory approaches. Labour constraints but also risk management for the farmers will be considered regarding the balance between the agro-ecological approaches developed and the economic constraints on the farm. Cross-cutting issues such as soil management and energy use efficiency will be taken into account. Synergies and trade-offs with and between the different environmental issues will be analysed. Transdisciplinary research and multi-actor approaches are necessary to engage farmers in reducing herbicides.

Type of action: RIA

SFS - 10. [2016/2017]: Organic Breeding – Increasing the competitiveness of the organic breeding and farming sector

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

Scope: Proposals will implement a range of measures to increase availability of organic seeds for a variety of crops, farming and environmental conditions. This will include an assessment of the current situation in EU Member States as regards availability of seeds, on-going breeding programmes as well as opportunities and constraints to organic seed market development. Work will also allow identifying relevant traits for a number of crops and conditions, developing and testing breeding approaches and generate tools and resources for (pre)-breeding/breeding. Proposals shall contribute to the development of a comprehensive strategy for organic breeding as a result of partnerships between the breeding, farming and research sectors.

Type of action: RIA

SFS - 11. [2017]: Organic Inputs – Critical inputs in organic farming

Specific Challenge: Despite having stricter standards and limitations with regard to the use of external input, organic agriculture still relies on a number of products allowed by the EU organic regulation (such as copper) partly due to a lack of economically viable alternatives. Efforts are needed to progress in the development of alternatives to inputs which are considered as critical and not fully line with the principles and expectations of organic production.

Scope: Projects should provide a comprehensive assessment of the actual use and need for critical external inputs in various types of organic plant and animal farming systems. Furthermore, work shall identify and develop alternatives to existing products and propose strategies for a gradual phasing out of critical inputs without compromising competitiveness of the organic sector. Activities shall allow for a wide geographic coverage within Europe, Associated Countries and Third Countries form the Mediterranean.

Type of action: RIA

SFS - 12. [2016/2017] Controlling outbreak of emerging diseases:

A. [2016] 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 to olive trees. There is growing concern over its potential to spread and establish throughout Europe. The consequences of such a scenario are considered to be major leading to significant yield losses and costly control measures in a number of crops. A recent EFSA scientific opinion has confirmed the significant threat to plant health and European agriculture posed by the pest.

Scope: Proposals will be built around a comprehensive package of actions to improve prevention, early detection and control of *Xylella fastidiosa*. They shall increase knowledge on host range, host pathogen and host plant interactions as well as on epidemiology of *Xylella* with a particular focus on the Apulian strain of *X. fastidiosa*. Practical guidelines and solutions shall be developed to early detect and control the outbreak and prevent spread of the disease. Attention shall be given to developing integrated measures for crop and disease management. International collaboration is encouraged with partners from countries affected by the pest.

B. [2017] Bottom-up topic on emerging diseases

Type of action: RIA

SFS - 13. [2016/2017] Advancing innovations in Integrated Pest Management - a role for SMEs

Specific Challenge: Integrated pest management (IPM) strategies are increasingly applied in order to control pests and diseases. IPM is based on a combination of techniques such as

biological control, habitat manipulation, modification of cultural practices, use of resistant varieties and pesticides (in the absence of other solutions). With increasing knowledge such as on pest evolution or on plant-pest-enemies mechanisms, the IPM "toolbox" is expanding providing significant openings for innovations.

Scope: SMEs are particularly well represented in the area of IPM. Activities will unleash their capacity to come up with innovative solutions for prevention, detection and control of pests and diseases relevant for agriculture and forestry.

Type of action: SME Instrument

SFS - 14. [2016/2017] Challenges for disease management: Perennial crops in the tropics and sub-tropics

Specific Challenge:

Favourable conditions for disease development in the tropics (and to a lesser extent) and sub-tropics hit perennial crops particularly hard, especially where these are grown in uniform plantings. Overall, losses are thought to be 50 to 100% higher in tropical than in temperate regions and estimates of the proportion losses in the tropics caused by diseases range from 30% to 50%. Effects of increased climatic variations are expected to further increase the occurrence of diseases and in consequence affect production of many crops which are economically important in the countries of production.

Scope: Proposals will develop an integrated approach towards management of important diseases of perennial tropical and sub-tropical crops. Activities will address gaps in our knowledge (e.g. on epidemiology, genetics, evolution of host–pathogen populations, pesticide resistance) and propose more effective, durable and sustainable management options which are based on a holistic view of agro-ecosystems. Activities and proposed solutions shall take into account how expected climatic changes may alter the current scenario of plant diseases and their management.

Type of action: RIA

SFS - 15. [2016]: Support for international research on animal health

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

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

Scope: This global initiative will consolidate and deepen the international collaboration on research in the area of animal health and in particular infectious animal diseases, including zoonoses. It will build on the existing activities of STAR-IDAZ global network of research programme owners and funding organisations by bringing together researchers and organisations investing in animal disease research (funding bodies) in order to achieve

specific targets relating to the control of priority animal diseases and zoonoses. The action will provide organisational support to the implementation of the global infectious diseases of animals and zoonoses consortium (STAR-IDAZ) goals, in close collaboration with the European Commission, research funding agencies from Member States and from other third countries involved through the formation of a scientific secretariat. It will assist the Consortium executive committee, and the establishment and running of working groups on priority diseases and issues and organising research gap analysis meetings. It will support information exchange among members of the participating organisations at all levels. It will communicate progress of Consortium research, including collecting and disseminating pertinent information and results to the researchers funded by the Consortium members.

Type of action: CSA

SFS - 16. [2016]: Validation of diagnostic tools for Animal Health

Specific Challenge: The detection and quantification of microorganisms of concern for animal health, including zoonotic agents, and correlates of infection and/or immunity in a fast and reliable way are critical components in the monitoring and control of their introduction or spread. These tools are essential to avoid or reduce related economic costs, trade disruptions or even sometimes human health risks. These methods are used not only by Competent Authorities, but also by practitioners, business operators.

In the last years, most of the research efforts have been put in the development of high throughput, generic, quick and cheap methods. A number of these methods have been validated intra-laboratory or through limited ring trials. In order for these methods to be used beyond research laboratories, additional work often needs to be performed to further test the methods such as further ring tests, development of reference materials, harmonisation or even adaptation for their implementation in field conditions (multi-targeting; pen-side tests).

Scope: The project aims primarily at harmonising and validating existing protocols for the detection and quantification of plant pests and other micro-organisms of concern for Animal Health. A good justification on the choice of protocols to be validated should be given. Research is built on existing results, but where necessary final further development of the promising protocols can be pursued aiming at bringing close to market end products. Where generic methods are tackled or preferred (e.g. based on next generation sequencing technologies) cooperation amongst stakeholders is encouraged to ensure use of the technologies for a broader spectrum of organisms. Connections with EU Reference Laboratories and European/International bodies for standardisation (e.g. CEN, ISO) or Reference bodies (e.g. OIE) should be ensured.

Type of action: Innovation Action

Potentially to be extended for plant health

SFS - 17. [2016]: Understanding Host-Pathogen Interactions

Specific Challenge: Disease emergence and spread are the result of a number of factors linked to the infectious agent, the host and the environment. The virulence of the strain and immunological status of the host(s) have a critical role for the infection to develop, remain, spread or disappear and for the animal to circumvent, become sick, a carrier or recover from the diseases. The biological interplay between pathogen and host(s), taking into account other microbiota, is essential to understand the dynamics of infections/diseases and to develop control strategies including a more targeted use of antimicrobials. The growing body of

evidence about the capacity of infectious agents to evolve and circumvent the host immunological reaction or treatments and profit from environmental niches, represent a real challenge. Although modern tools have helped track pathogens more easily, a lot still needs to be done on the host reaction and how this knowledge can be used to develop control strategies, in particular vaccines or diagnostics and the related opportunity to decrease the use of anti-microbials.

Scope: Proposals should focus on fundamental research on host-pathogen interaction an important epizootic disease, like potentially pandemic animal influenza, where there is a clear lack of knowledge about the epidemiology and/or reasons for failing to develop more effective antimicrobials, vaccines and diagnostics. The research performed is to improve knowledge on the triangle pathogen, host and their interaction, in order to contribute to the understanding of the dynamics of the disease and support improved or new diagnostic and control tools.

Type of action: RIA

SFS - 18. [2017]: Breeding multipurpose 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 animal or system level. These systems may make use of local, multipurpose breeds as well as, or in place of more intensively and highly productive breeds. The genetic variation within breeds could also be used more effectively. At animal level, enhancing animals' ability to overcome emerging diseases, nutritional or environmental challenges will help them to stay healthy and well adapted to their living conditions, i.e. increase their resilience. Progress here will be a key factor in improving the resilience traits simultaneous with other traits important for a sustainable livestock sector. The challenge for livestock breeding is to address both the need for efficiency and for resilience at animal level. To accelerate progress on these issues an important need is to develop improved tools to speed up the identification and introduction of important genomic and phenotypic characteristics of resilience and efficiency, and tools to measure those traits.

Scope: The research will target efficiency related traits (e.g. in particular GHG emissions/Feed Conversion Ratio) as well as resilience related traits (e.g. feed diversity; thermoregulation; gut health; fertility), the possible relations between them (synergies; trade-offs) to address balanced breeding goals. Research activities should at least assess and exploit the potential of non-main stream genetic resources (local/mixed breeds). They should target at least ruminants for beef production and link with other EU initiatives in the dairy sector. Research may address monogastrics. Research should include tools/systems for measuring phenotypes and assess feasibility of schemes for improving targeted livestock.

Type of action: RIA

SFS - 19. [2017]: Bee health

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., even possibly climate change. Stressors do not necessarily act in isolation either in combination but such interactions are not addressed currently by regulatory, beekeeping or agricultural procedures. Even studying these interactions poses a major challenge due to the difficulty of testing and

controlling them in natural conditions. Indeed there are gaps in our understanding on the underlying mechanisms behind these interactions and their interpretation in the observed trends. Previous EU projects have been (and some still are) trying to shed some light on specific elements. The European Food Safety Authority and the EU Reference Laboratory for bee health is also active in addressing more focused issues on the development of a holistic risk assessment of multiple stressors in bees. Nevertheless no significant breakthrough took place so far in our understanding or in our ability to understand and therefore mitigate the stressors of bee health (at least not without the alleged detriment of other sectors) and to ensure sustainable bee keeping and/or providing adequate pollination services in the EU.

Scope: wide scope research building on and synthesise knowledge from previous EU projects as well as on national research and existing networks, EFSA and EURL initiatives. The project should provide answers to the most critical gaps in achieving sustainable bee keeping and/or providing adequate pollination services in the EU, including socio-economic factors, and provide mitigation measures for the most critical gaps/stressors. It should work on the basis of a complete mapping of our understanding of the situation, especially as regards recent research. It should eventually provide model systems for sustainable apiculture in several characteristic EU settings of beekeeping and sustainable pollination for major dependent crops in EU (with or without domestic honeybees).

Type of action: *TBC*

SFS - 20. [2017]: Pesticides

In parallel to the above named bee topic it is considered to open a call topic on pesticides to allow for studies on wider effects of pesticides on (agro) ecosystems, evolved resistance to pesticides and development of non-chemical tools and less hazardous products for pest control. *TBC*

SFS - 21. [XX]: Support to the implementation of the EU-Africa partnership on Food and Nutrition Security and Sustainable Agriculture

The establishment of a structured partnership EU – African Union will be supported by a platform of several actions which still have to be defined. The roadmap of the High Level Policy Dialogue (HLPD) EU - African Union on Science, Technology and Innovation will build the frame once the contributions from the stakeholder consultation are taken into account. Part of the approach could be a Cofund action, a CSA could support the building of approaches and policies to link local innovation needs to a research agenda, specific research projects could fill gaps such as monitoring of agricultural production in Africa by earth observation or other topics suited to encourage a joint EU African effort. *TBC*

SFS - 22. [2017]: support to the implementation of the EU-Mediterranean partnership on food systems and water resources (PRIMA)

TBC

SFS - 23. [2016/2017] ERANET COFUND: Public-Public Partnerships in the bioeconomy

Specific challenge: Agriculture, forestry and the agri-food sector are integral parts of the European economy and society. They are subject to multiple pressures from external drivers, which include rising food, feed, fuel and fibre demand, globalisation, environmental changes and public health aspects, and are constrained by planetary boundaries such as land and water limits. With the expected increase in global population, demand for animal food products and competition for natural resources, agriculture and forestry will need to become more efficient, and sustainable.

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

[In the framework of WP development, discussions were launched with regard to the possible inclusion of the selected proposals under a Framework Partnership Agreement 'umbrella'. While the exact details of how an FPA works are still being elucidated, the inclusion in an FPA of all or selected ERANET topics (out of those presented above and beyond) is seen as a suitable option.]

A. [2016] Organic farming

Objectives: In recent years the organic market in the EU, driven by steadily increasing demand, has developed significantly (19.7 billion euro 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 as well as the surface under organic production have grown at a fast pace. Each year, 500.000 hectares of agricultural land convert to organic in the Union. In the period 2000-2012, the total organic area has increased by 6.7% yearly on average, to reach an estimated 9.6 million ha, which is 5.4% of the total utilised agricultural area in the EU. Organic aquaculture production is also growing fast, following the introduction of EU rules in 2009. The overall objective is to improve jobs and growth in the organic sector through improved organic farming and food chains, by consolidating the financing for transnational research and innovation activities. Specifically, projects developed under the proposed co-fund action will: i) improve the production potential under organic regulations; ii) improve sustainability of agricultural production; 3) increase animal welfare and resource efficiency; and iv) link-up to innovation needs of EIP operational groups. This proposal is a follow-up of CORE Organic I (FP6) and CORE Organic 2 (FP7). On a policy development level, the proposal is in line with the EC Communication on the Action Plan for Organic Production in the European Union, the existing regulations of the organic sector and the Commission proposal for new regulation for organic production (COM(2014) 180 final) by increasing the innovative capacity of the sector if certain exemptions phase out.

Impacts: development of more sustainable agricultural production systems and food value chains and fulfilment of the growing demand for organic products on behalf of an increasing consumer market, support to CAP and organic farming regulations and other relevant policy areas, e.g. health and trade and jobs.

B. [2017] Sustainable crop production

Objectives: To pool resources and know-how to develop and test solutions for sustainable crop production, including areas such as breeding, nutrients recycling and soil-plant-

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

atmosphere interactions, plant health and protection, management practices and added value of the agricultural products.

Impacts: Activities will contribute to developing cropping systems with an improved performance in terms of reducing environmental impacts, resource-use efficiency and quality of products. It will support the farming sector in adapting to expected changes resulting e.g. from emerging resource scarcities, environmental variations, demography, consumer preferences, global trade.

C. [2017] Innovative forest-based bioeconomy

Objectives: 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, and represents some 8% of the EU's total manufacturing value. The proposed Co-fund 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 and resource-efficient sector within the growing European bioeconomy. Strategic modernisation of traditional forestry systems and value chains including innovative business concepts and production technologies will be needed to develop the forestry sector and the European bioeconomy, of which it has a very significant share. This proposal has been prepared in collaboration with, and is conceived as a follow-up to the current forest-related ERANETs: WoodWisdom ERANET+, Foresterra ERANET and SUMFOREST ERANET.

Impacts: address 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 (C sequestration in wood and wood-based products).

D. [2016] GMO research

Objectives: 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, and 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 diversity of stakeholders and end-users (e.g. non-governmental organisations, industry, farmers). This is intended to strengthen ownership of the ERA-Net among stakeholders in order to encourage participation of different scientific communities in the future joint transnational calls, to enhance collaboration between actors and to increase the accountability of research trajectories and outcomes. There is a need to better and more openly communicate on 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 making an informed choice about whether and how biotechnologies can be used to deliver solutions to the 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”.

Impacts: 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, greening agriculture, and for the mitigation of and the adaptation to climate change. Therefore, these goals are taken as a benchmark to assess the character and magnitude of possible effects of GMOs and their contribution to

these goals and inform decision-making on how these can be scientifically addressed in a meaningful way. The ERA-Net projects will also deliver more meaningful results that can better inform regulatory as well as political decisions in order to protect the environment, human and animal health, and valued socio-economic conditions (e.g. structure of rural communities, sharing of power among different actors in the value chain) than the present uncoordinated research structure. 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, by protecting biodiversity through the replacement of current practices with large negative footprints, by enhancing animal welfare or the livelihood in rural communities).

E. [2016] Sustainable food production and consumption

Objectives: SUSFOOD (“SUStainable FOOD production and consumption”) is an ERA-Net under FP7. It seeks to increase collaboration and coordination between national research activities on the sustainability of food production and consumption, with a main focus on the food supply chain beyond the farm gate. The current SUSFOOD ERA-Net ends in November 2014. SUSFOOD has been very well reviewed by the Commission as an example of a well performing ERA-Net. It has published its Country reports and launched its Strategic Research Agenda (SRA) in early 2014. In addition it has organised, implemented and evaluated two calls for proposals which shows an excellent rate of return for the money invested by the EC (1 million€). In total 15 to 20 projects will have been funded by the SUSFOOD calls and that is far from exhausting the four priority research areas (innovation in food processing technologies, food waste and side streams, understanding consumer behaviour and innovation in food products) – out of the eight referred to in the SUSFOOD SRA. The national consultations in the 16 countries, from institutions and stakeholders along the food chain, also show that there is a common will from the SUSFOOD Countries to continue efforts for promoting the SUSFOOD research priorities and carrying on organising research calls.

Impacts: Innovation in food processing technologies; Redesign 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 of food products and use of new raw materials for food products; Harmonisation of the methods and metrics for integrated assessment of sustainability of food products and food patterns; Connection between stakeholders and food systems; Understanding consumer behaviour and food choices; Integration of information systems for personalized and sustainable choices.

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

In 2015 JPI HDHL will launch a Joint Action on Intestinal Microbiomics that should contribute to the following vision: To develop dietary interventions that modulate the intestinal microbiome to promote health and/or prevent the development of non-communicable chronic diseases. The programme should generate new knowledge to support health maintenance and/or new treatments.

The resources (e.g., time and budget) of the first projects that will run under the umbrella of the Joint Action on Intestinal Microbiomics will be insufficient to complete the vision above. A complementary ERANet starting when these projects are (almost) at their end – would however result in a fully active knowledge platform and much need investment in the research that will allow the realisation of the full opportunities and the development of new and innovative healthy products.

G. [2017] Nutrition and epigenome

Although genome-wide association studies have yielded a wealth of information on human genetic heterogeneity and risk alleles, it has become obvious that information on dietary exposure and phenotype is insufficient for defining causal relationships. There is an urgent need to gain a thorough understanding of how nutrients and non-nutrients interact with the human genome at a molecular level throughout the life span. In first instance research should focus on the identification of nutritional intakes and epigenetic modifications during pregnancy, infancy and early childhood that predispose or prevent chronic disease.

An ERANet in this area would provide the required investment to fully realise the opportunity for innovations. This investment would build on the existing capacity within some of the MS and provide opportunities to develop capacity in others, positioning the countries involved in the JPI HDHL at the forefront of this research area.

The main objective of these ERA-NETs Cofund is to pool the necessary financial resources from the participating national (or regional) research programmes and the EU and to implement joint trans-national calls with EU co-funding in the above areas (one co-funded call per grant agreement, resulting in grants to third parties). Thematic focusing of these calls should be commensurate with the funds available, so as to ensure a reasonable rate of success in the call. The ERA-NETs should seek synergies with other relevant European and international research and innovation initiatives affecting sustainability and resilience of agriculture and food systems, in particular the FACCE and HDHL Joint Programming Initiatives. In line with the objectives of the EU strategy for international cooperation in research and innovation, proposals are encouraged to consider international cooperation, and the ERA-NETs should be open to participation by third countries national programmes.

The proposals should also aim at implementing other joint activities including additional joint calls without EU co-funding.

In the framework of WP development, discussions were launched with regard to the possible inclusion of the selected proposals under a Framework Partnership Agreement 'umbrella'. While the exact details of how an FPA works are still being elucidated, the inclusion in an FPA of all or selected ERANET topics (out of those presented above and beyond) is seen as a suitable option.

Type of action: ERA-NETs Cofund, possibly all or some of them under a Framework Partnership Agreement 'umbrella'.

SFS - 24. [2016/2017]: Towards an integrated and effective regional fisheries management

Specific Challenge: The new Common Fisheries Policy (CFP) foresees the regionalisation of fisheries management as a means to achieve its objectives. This regional approach requires a culture of collaboration and supporting structures as well as sufficient and interoperable biotic, abiotic and socioeconomic data. These data are costly to collect and not always accessible by all potential legitimate users although they are also needed for the implementation of several other EU and international policies.

Scope: Proposals should address one of the following issues (A) and (B).

A. 2016 – The proposals should identify existing regional governance structures, assess their performance and efficiency, highlight strengths and weaknesses and address the scientific, technical and organisational adjustments needed to fully achieve the regional approach, considering also how to accommodate and spatially manage all activities that are competing with fisheries for marine space. Proposals should address the main fisheries in all EU marine areas and highlight the regional and sub-regional specificities.

B. 2017 – The proposals should explore the possibilities for data collection approaches that fulfil the requirements of the CFP and also consider the requirements of other related policies, take into account regional specificities, minimise data collection effort and costs, maximize interoperability of data and comparability of assessment systems and minimise the damage on species and habitats. Synergies and links with the European Marine Observation and Data Network should be explored and established.

Type of action: A: RIA; B: IA

SFS - 25. [2017]: Advancing basic biological knowledge on commercially important fish species

Specific Challenge: Efficient fisheries management depends on the thorough knowledge of the biology and ecology of fish species but our understanding of several aspects, such as their migration, reproduction and genetics is far from complete.

Scope: Proposals should focus on a limited number of species that are important for several EU countries, in order to review existing knowledge, identify important gaps and perform research that can be completed in the frame of the project.

Type of action: RIA

SFS - 26. [2017]: Smart fisheries technologies

Specific Challenge: Although selectivity of some gears has improved recently, there are still unexplored possibilities for more technologically advanced fisheries, particularly in combination with the aquaculture industry.

Scope: The proposals should explore possibilities to increase the selectivity of gears. They should identify species with promising potential for the fattening industry and develop related know-how. They should explore methods to ensure that those fish are caught intact and kept on board alive and should address important and promising fisheries in all European seas.

Type of action: IA

SFS - 27. [2016]: Improving technical performance of the Mediterranean fish farming sector (including molluscs)

Specific Challenge: Mediterranean aquaculture is contributing to food security, employment and trade in the region. An improved technical performance together with a shift from production-oriented growth to market-oriented and consumer responsive approach is needed to further enhance its contribution in these domains.

Scope: Proposals should aim at integrating and improving the technical viability of the current production systems of the Mediterranean aquaculture, with new/innovative technologies and practices to ensure sustainability and growth of the sector.

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

In particular proposals should aim at substantially improving current key performance indicators (KPI) of the principal Mediterranean species - growth rates, mortality and feed efficiency. In addition proposals should develop tools for marker-assisted selection.

Proposals should also look into Mediterranean aquaculture market development, making use of the new technologies for promotion, product development and commercialisation of Mediterranean aquaculture production in new and existing markets.

Type of action: RIA

SFS - 28. [2016-]: Reinforcing EU-ASEAN international cooperation on sustainable intensification of aquaculture

Specific challenge: With 90 % of all world aquaculture production in Asia, and Europe importing close to 70 % of its seafood (mainly from Asia), both regions have interests to cooperate in developing sustainable solutions since within the next decade production has to nearly double to meet the increasing seafood market demands. The sustainable intensification and exploitation of aquaculture is a major challenge for global seafood security. More efforts are needed in technology innovation, resource efficiency, reduced environmental impact, marketing and international collaboration between the EU and ASEAN countries to make future aquaculture more sustainable while providing mutual benefits.

Scope: Proposals should provide a range of actions and recommendations for facilitating productive and mutually beneficial cooperation between the EU and ASEAN countries. Focus should be on effective animal health management, more ecosystem-based farming practices, appropriate environmental planning/zoning and maximised feed security and safety. At the same time, the proposals should promote new networks and facilitate industrial partnerships and uptake of innovations. Proposals should also reinforce capacity building through an alignment of EU partner efforts, including industrial apprenticeship opportunities.

Type of action: CSA

SFS - 29. [2016] SCAR Support Action

Specific challenge: For the past ten years the standing committee on agricultural research (SCAR) has helped to develop and consolidate the European Research Area (ERA) across many bioeconomy sectors besides agriculture. This has been achieved through a dedicated core of National representatives who despite limited resources and increasing responsibilities and diversification have made SCAR such an important ERA input. There is still however a lot to do related to improving the alignment and interoperability of national research programmes; to better support the work of the different strategic and collaborative working groups, ERANETS, and JPIs; to supporting the widened scope of SCAR into fisheries, forestry biomass and food; to stimulating and maintaining the interest of relevant countries not yet fully involved; to improving the organisation communication and dissemination of SCAR deliverables and initiatives.

Scope: To help assist in the workings of SCAR a support action is proposed which will help modernise and improve current SCAR communication tools, help smaller countries to attend and participate in the growing diversity of SCAR, will support for organising, for input of

external expertise and for reporting in strategic and collaborative working groups, and help to structure the reporting facilities of the various different ERA instruments.

Type of action: Coordination and support action (TBC)

Environment-smart and climate-smart primary production

SFS - 30. [2016]: LEGUMES - Transition paths to sustainable legume-based cropping systems and agri-feed and food chains.

Specific Challenge: Leguminous plants – thanks to their nitrogen-fixing properties – are recognized to contribute to increase soil fertility and have a positive impact on the environment. Additionally, legume crops are a critical source of plant-based proteins for people as well as for animals. On both issues, EU has developed strong dependencies (energetic and plant-proteins), while, compared to other main agricultural regions in the world, the area dedicated to legume crops within the EU remains relatively low and even decreased during the last decades. Regarding the potential of eco-systems services delivered by legumes, needs for transition pathways towards sustainable agro-food and feed chains have been identified.

Scope: Taking into account the diversity of legume species available and the pedo-climatic conditions over Europe, representative farm networks will be developed integrating legumes in their cropping systems. Based on those case studies and existing data, the match between legumes production potentials and feed needs but also developing food markets will be investigated at the European level highlighting complementarities between different regions or within regions. The impact of the development of legumes on other productions as well as the delivery of eco-system services (e.g. climate change mitigation, reduction of pesticides and fertilizers pollution) will be assessed. Path dependency and lock-ins regarding the non-development of legume crops in the EU will be analysed at different levels. Coverage of both conventional and organic sectors is expected. Transition paths towards sustainable legume-based cropping systems and agri-feed and food chains will be developed. Transdisciplinary research and multi-actor approaches are necessary to engage actors in developing the production and use of legume crops.

Type of action: RIA

SFS - 31. [2017]: Permanent grassland – farming systems and policies

Specific Challenge: Permanent grasslands are clearly identified as important for the delivery of ecosystem services (e.g. climate change mitigation, biodiversity, water quality, floods control...). Closely related to the competitiveness of ruminant-based farming systems, the maintenance of permanent grassland is at stake in areas where intensified farming systems or practices are feasible but also in remote areas where grasslands face risks of land abandonment.

Scope: Proposals should explore integrated approaches for permanent grassland management which are cost effective, environmentally sound and easily manageable. Synergies and trade-

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

offs between productivity and delivery of ecosystem services will be analysed. Different grassland policies will be evaluated regarding especially the public goods they are targeting. Proposals will develop decision tools for permanent grassland management taking into account both the biomass production for economic valorisation (for ruminant and innovative markets) and the delivery of public goods to the society. Proposals shall use trans-disciplinary research methods and fall under the concept of multi-actor approach.

Type of action: RIA

SFS - 32. [2016]: Soil-based ecosystem services and innovations

Specific Challenge: Soils provide a number of essential ecosystem services which support amongst others productivity and pest control in primary production, water quality, flood control, climate regulation and above-ground biodiversity. These multiple services are far from being fully uncovered and more knowledge is needed to ensure their continued provision and effective use in particular in agriculture and forestry.

Scope: Activities under this topic will provide a more detailed and systematic insight into the range and characteristics (biological, physical, biochemical) of ecosystems services provided by soils. They will also look into how these services are affected (in positive and negative ways) by different types of land management and will develop measures to foster their delivery by agriculture and forestry. Activities shall provide further evidence on the specific benefits of ecosystems services for farming and forestry and show how these can be used in practical terms to support productivity and resilience in primary production across a range of environments and land use systems. In this context particular attention shall be given to soil biodiversity and innovations arising from smart management of the rhizosphere.

Type of action: RIA

SFS - 33. [2017]: Functional Biodiversity – Productivity gains through functional biodiversity – effective crop pollinators and pest predators interplay

Specific Challenge: Biodiversity and various ecosystems provide many different services to agricultural production, not all of which are properly known. Using these services in a smart way enables agriculture to become more sustainable and allows for reduction of external inputs. To develop agricultural systems maximising services from ecosystems, a knowledge leap is necessary which can be supported by various scientific areas, from developing farming practices to modern technologies.

Scope: Proposals will explore the functional role of biodiversity in the delivery of ecosystem services, in particular the interactions between plants/animals and other organisms and natural enemies of pests and diseases, pollination, etc. There is a need to increase the understanding of factors which govern the performance of organisms to deliver ecosystem services, including agricultural management and landscape characteristics. Proposals will study and test approaches to increase the performance of ecosystem services by targeted promotion of pollinators and predators through habitat provision and management (e.g. by means of deploying pollinator friendly practices and crops). Prototypes of sustainable agro-ecology systems at various scales from farm level to landscape / territorial level will be developed.

Type of action: RIA

SFS - 34. [2017]: Socio-Eco-Economics – Socio economics in ecological approaches

Specific Challenge: Ecological approaches or ecosystem-based approaches have emerged as an alternative to farming practices based on chemical inputs. The farming systems implementing those approaches are often defined as "low-input". Within the concept of eco-functional intensification those systems are often using more knowledge and labour per hectare rather than those based on chemical inputs. Those production systems are delivering both agricultural products for the market and public goods for the society. It is necessary to understand better the socio-economic and policy factors/drivers that hinder or enhance the development of those systems.

Scope: Based on case studies, the proposals will compare identified production systems implementing ecological approaches with conventional farms in the same sectors of production. Different sectors will be covered (e.g. arable crops, livestock, vegetables and fruits, vineyards etc.). Competitiveness and public goods delivery will be evaluated through different indicators. Specific emphasis will be given to the analysis of the labour productivity regarding the amount of private & public goods produced. Incomes of those systems will be analysed regarding market and public payments. Different strategies will be compared i.e. pursuing economies of scale in the conventional systems versus economies of scope proposed in ecological approaches.

Type of action: RIA

SFS - 35. [2017]: Closing loops at farm and regional levels to mitigate climate GHG: focus on carbon and nitrogen cycling in agro ecosystems

Specific Challenge: Increasing concentrations of greenhouse gases in the atmosphere and of nitrogen in receiving waters are environmental issues of major concern. Agriculture and forestry - despite also being large carbon sinks –contribute significantly to these emissions, e.g. through land use change, soil C losses, animal production and N-fertilizer use. Mitigation solutions need to be based on a thorough understanding of the cycling of carbon (C) and nitrogen (N) at various levels to result in lower emission agricultural (and forestry) systems.

Scope: Proposals will provide a comprehensive analysis of C and N flows and cycling on-farms, in forests and within landscapes taking into account different types of production systems and impacts of land use intensification. Work shall consider trade-offs and synergies between C and N and seek for efficiencies and loops including at the interfaces between plant and animal production (e.g. fertiliser/manure or protein/feed). Activities shall develop and test agricultural practices that reduce GHG and N intensity in primary production taking due account of soil regenerative measures as drivers of carbon storage and N-efficiency. Proposals will also tackle consumption patterns and establish how demand-side interventions (e.g. on diets, waste reduction) can be paired with efforts to lower emissions and optimise C/N ratios in primary production. This will include looking at international trade in relation to EU supply with energy and proteins.

Type of action: RIA

SFS - 36. [2017] – 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 the last decades: farm sizes have steadily increased as well as investment levels so as to maintain farming income. Risks in agriculture have increased in the last decades resulting from the suppression of price policies, globalisation and a more frequent occurrence of extreme weather events, among others. These aspects have a strong bearing on the demography of farmers and the attractiveness of the sector. It is therefore necessary to analyse them thoroughly to understand the sector's dynamics in the long term and develop an adequate enabling environment.

Scope: activities should provide a thorough investigation of the socio-economics of farming demographics so as to allow long-term projections and modelling and to measure the impacts of relevant policies and their possible improvement so as to facilitate entry in the sector. Investigations will also aim at understanding farmer risk management strategies and behaviours towards adoption and use of risk management tools, their behaviours in market crisis situations and the role of policy tools. Research will extend to strategies at meso / macro-levels to cope with risks associated to an increased occurrence of extreme weather events.

Type of action: RIA

SFS - 37. [2016-2017]: Promoting and supporting innovation in aquaculture production systems: eco-intensification inland (including fresh water), coastal zone and offshore

Specific Challenge: Aquaculture is an attractive and important component of coastal and rural livelihoods in situations where increasing population pressures, environmental degradation or loss of access limits catches from wild fisheries. Aquaculture development aims at supporting and facilitating a sustainable economy by business development and diversification.

Sustainable intensification of aquaculture has been identified as the major challenge ahead to meet global seafood security needs for future generations. The eco-intensification of aquaculture production is achieved sustainably only through balancing its demands on water, land and feed resources to boost productivity of the systems.

Scope: Proposals should support aquaculture productions and communities with innovative solutions and technologies to ensure a sustainable offshore, coastal and inland development and growth. Proposals should look at enhancing integrated aquaculture activities (species and systems) in a sustainable way, by implementing new/emerging technologies and innovation in management system, focusing on sound economic reduction of operational costs for innovative aquaculture production system such as such as recirculating aquaculture systems; organic aquaculture; integrated multi-trophic aquaculture, including macro algae production; and poly-culture.

Proposals should address one of the following issues (A) and (B)

A. 2016 - Marine aquaculture

B. 2017 – Freshwater inland aquaculture.

Type of action: A: RIA; B: RIA

A competitive food industry

SFS - 38. [2016]: Shaping sustainable and resilient agro-food systems: understanding value chain dynamics

Specific challenge: Sustainable food and nutrition security relies on the diverse food systems which are operating in an increasingly complex environment (e.g. changing socio-economic and political context, scarcity of natural resources, climate change). Agro-food chains play a key role in the EU economy and society: ensuring food and nutrition security, global and local economy, providing jobs and having a significant impact on environment. Therefore, an understanding of the dynamics in agro-food value chains and their environment is a prerequisite to foster sustainability and resilience of the agro-food system as a whole.

Scope: A holistic approach is needed to capture and understand the dynamics in agro-food chains and their underlying drivers having a direct and indirect influence on the organisation of the value chains and their performance. An analysis is needed to map a large diversity of chains (short food chains included) across Europe and give a thorough insight in upstream and downstream chain flows. A special attention is required on the chain organisation, price transmission, behaviour of the chain members and their impact on the chain itself, cost structure (freight included), organisation of logistics, institutional arrangements, marketing standards, balance of power, risk and added value within the food chain. Proposal should map the policies targeted at different chain levels (including consumption) which will allow identifying interactions (coherence/divergence) between them and understanding their impact on chain performance in terms of resilience and sustainability. Furthermore, changes in demand (global and local) as well as emerging food dietary and consumption patterns should be explored and how they are impacting organisation of agro-food chains and its adaptability is to be addressed. A foresight exercise should contribute to formulation of potential future scenarios.

Type of action: RIA

SFS - 39. [2016]: Unlocking the competitiveness and sustainability potential of agro-food value chains

Specific challenge: Sustainability and resilience of agro-food systems are challenged by various interrelated challenges, such as changing socio-economic and political context, scarcity of natural resources and climate change. These challenging roles cannot be met by any individual action in the chain, but require multi-stakeholder actions and coordination of initiatives along the value chains. A new holistic, systemic approach for design of processes

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

and logistics in the agro-food chains is needed to unlock the full potential of agro-food chains which will deliver across economic, social and environmental sustainability dimensions.

Scope: Research should give an in-depth insight into linkages and interactions between agro-food value chain stakeholders, including understanding their perception and behaviour towards sustainability and cooperation. A holistic approach to improve mutual understanding and collaboration between value chain stakeholders (identifying incentives and barriers as well as strategies and tools to overcome them) is to be explored, consequently leading to creation of favourable conditions for cooperation and innovation within the value chains. A concept of social innovation and ways to measure it throughout the value chain should be explored with this respect, including the engagement of society in food production. A plethora of policies influencing food production and consumption should be explored and their implications on creating favourable overall conditions for cooperation and innovation along the food chain.

Type of action: RIA

SFS - 40. [2017]: Reducing food losses along the value chains

Specific challenge: According to FAO around one-third of food produced for human consumption is lost or wasted globally. In the case of fruit and vegetable global food losses in Europe are even higher, around 45%. A need to meet increasing demand for food in coming years makes it compulsory to reduce a significant amount of food losses and waste along the food value chains. A considerable share of these losses is due to non-optimal chain processes and chain management. Therefore, a new systemic and interdisciplinary approach is needed for design of processes and smart logistics in the agro-food chains to reduce the food losses and food waste.

Scope: Proposals should investigate ways to reduce food losses (in particular avoidable perishable waste) along the food value chain from production, post-harvest, storage, transport, distribution, retail and consumption. It should encompass development of new technologies, models, decision support systems on one side and chain management approaches (operational and strategic) on the other side.

Type of action: IA

SFS - 41. [2016] PACK: Innovative solutions for sustainable food packaging

Specific Challenge: Over recent decades much research has been carried out regarding innovative food packaging technologies and solutions (active, intelligent, recyclable, easy-to-use, organic, antibacterial, etc.). Research aimed at decreasing the environmental footprint of packaging material, reducing food waste by increasing shelf-life of food and providing indications of food spoilage, improving product design and optimising process efficiency, reducing the need for chemical preservatives while maintaining the nutritional and sensorial properties of food. In spite of progress made much remains to be done to overcome the barriers to market uptake of many promising technologies.

Scope: Proposals should clearly address the problems associated with scaling-up and commercialisation of eco-innovative solutions to packaging in a business world that is moving from a linear to a circular economy. Activities may comprise prototyping, testing,

demonstrating and piloting in a (near to) operational environment, as well as experimental production, all with a view to paving the way for subsequent market replication. Proposals may, if needed, include limited R&D activities. In cases where there are clear market failures or barriers to uptake, proposals could comprise activities such as validating the benefits for the users/buyers, validating technical and economic performance at system level, validating standards, as well as activities to prepare market uptake and ensuring optimal access to and dissemination of results. Participation of all relevant actors in the food production and supply chain is encouraged. Demonstration activities will require the involvement of packaging and food processing companies, retailers and civil society to fill the gap between developed concepts and their practical implementation.

Type of action: IA

SFS - 42. [2017] NATURAL: Natural Foods and Clean Labels

Specific challenge: A growing body of evidence suggests that a diet consisting of minimally processed foods has considerable health benefits. Although no common or regulatory definition exists, these types of foods are often described as "Natural foods" with "clean labels", due to their limited use of added flavourings and preserving agents, and often also a lack of allergens. However, the further and sustainable market uptake of such foods in the organic and/or non-organic markets requires innovation across the whole value chain, ranging from product reformulation, process adjustment or introduction of new process technologies, packaging or other preservation solutions taking into account food quality and safety, food waste prevention, and consumer aspects such as convenience, price, and availability.

Scope: To adjust existing processes and product composition and/or to investigate new, eco-friendly technologies, ensuring a long(er) shelf life without affecting the health benefits. A fork to farm research approach, taking into account all steps in the food production process such as post-harvest handling, processing, packaging, storage etc. needs to be adapted to the demand for natural food and clean labels through innovative production processes and new technologies or by the adjustment of traditional processes and product compositions. To contribute to food processing solutions in line with organic and/or non-organic food processing rules and regulations. To investigate the effect of this process adaptation on food waste, safety, quality and (environmental and resource) sustainability of the whole value chain. To evaluate marketable applications based on industry constraints and consumer preferences and acceptance. To clearly disseminate, communicate and exploit the project results to targeted audiences (NOT the 'general public').

Type of action: IA

SFS - 43. [2016/2017] FOODSMES: Resource-efficient eco-innovative food production and processing

Specific challenge: To remain competitive, limit environmental degradation and optimise the efficient use of resources, the development of more resource-efficient and sustainable food production and processing, throughout the food system, at all scales of business, in a competitive and innovative way is required. Current food production and processing systems, especially in the SME sector, need to be revised and optimised with the aim of achieving a significant reduction in water and energy use, greenhouse gas emissions and waste generation, while at the same time improving the efficiency in the use of raw materials, increasing climate resilience and ensuring or improving shelf life, food safety and quality. New competitive eco-

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

innovative processes should be developed, within the framework of a transition towards a more resource-efficient, sustainable circular economy.

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

In phase 1, ... Funding will be provided in the form of a lump sum of EUR 50,000. Projects should last around 6 months.

In phase 2, ... The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should last between 12 and 24 months.

In addition, in phase 3, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme.

Type of action: SME Instrument (70%)

Healthy and safe foods and diets for all

SFS - 44. [2017]: Co-fund on "One Health" (zoonoses – emerging threats)

(This is proposed as successor to the FP7 SafefoodEra ERANET and the European FP6 Network of Excellence Med-Vet-Net.)

Specific Challenge: Diseases naturally transmitted from animals to man, termed zoonoses, constitute major public health risks and generate emerging disease problems and related issues like anti-microbial resistance. Such diseases, especially when food-borne, have significant social and financial impacts in Europe and need to be addressed across the whole farm to fork food chain. Research is needed to better understand processes triggering and propagating emerging diseases, their impact on public health and to improve the means to control these diseases with a One Health perspective. Actions are undertaken to identify and characterize emerging risks in the field of food and feed safety, by developing a capacity to collect and analyse information. Actions are undertaken to identify and characterize new toxic or microbial threats by supporting research on state-of-the-art tools for reference and surveillance. There is a need and added value in integrating further and aligning the national research programmes in the area and further support related policy activities.

Scope: The overarching goal is to deal with zoonotic microbial intoxication (including natural toxins, but excluding heavy metals and pesticides) and the risks associated with the animal reservoirs, especially animals for food production and their exposure routes. Related emerging threats such as antimicrobial resistance will be taken into account. All the agents involved including viruses, bacteria, parasites and nucleotide sequences/genetic material conferring antimicrobial resistance are within the scope of the action. State-of-the-art technologies taking into account genomics research and modern tools including biotechnological and epidemiological advances will be employed. Coherence of research activities with public health and animal health policies will be sought.

Type of action: Co-Fund (TBD)

SFS - 45. [2016] HEALTHKID: Encouraging healthy dietary choices in childhood and measuring its impact on health

Specific challenge: Exercising healthy eating is both an opportunity and a challenge for society today. Starting from an early age, diet has strong impacts on short-term, medium-term and long-term health. Determinants of food choice are multiple, and their individual contribution and synergies are not yet well understood. While consumer choice has never been as broad as today, and access to information on the benefit of healthy diets is easily available, consumer attitudes towards food choices still often result in the selection of unbalanced diets. This has a significant health impact even at early ages, namely increasing rates in obesity and Type 2 diabetes. Encouraging healthy consumer choices through the use of tools such as food education programmes in schools at early ages has been explored in recent times and preliminary results show potential for increased 'healthy choices'. Trialling tools for driving healthy consumer choices at an early age, such as food education programmes in schools, with support to local communities, and linking these to biometric and diet-related disease trends and cost-benefit analysis could provide the bases for policy considerations on the development and implementation of robust food education programmes in the EU.

Scope: Transdisciplinary research and multi-actor approaches including input from social sciences and humanities are necessary when developing and implementing tools for guiding consumer choice at early ages, such as food education programmes in schools, in order to encourage healthy dietary choices with support to local communities. Assessing the biometrics of public health impact of such tools and/or programmes, including impact on diet related diseases, and the cost-benefit analysis of the interventions will be done in parallel with control subpopulations. Tools and/or programmes will consider a range of geographical, socio-economic and cultural factors, and include several EU Member States. It should build on existing actions/programmes. Outcomes will deliver ready-to-use models of tools for driving consumer choice at early ages (e.g. food education programmes in schools) and scientific results of their public health impact including cost-benefit analysis in order to inform decision makers in the true value of such programmes.

Type of action: RIA

SFS - 46. [2017] FOODRISK: The impact of consumer practices in biological and chemical food safety risks and mitigation strategies

Specific challenge: The safety regulation of the food supply chain from farm to retail has achieved significant advances in consumer protection. Examples of this include controlling the occurrence of certain food-borne pathogens at farm and retail level via microbiological targets and criteria, or of hazardous contaminants and other chemicals via the establishment of maximum residue limits and levels. Consumer attitudes towards food handling and preparation, including manipulation of its close environment (e.g. particular transport, home storage), can significantly contribute to the risk of exposure, in particular to certain hazards which may not be easily or significantly controlled earlier in the food chain (e.g. *Campylobacter*), or that arise because of consumer practices themselves (e.g. acrylamide, furans). Scientific data on the contribution of consumer practices to mitigate or enhance those risks, and information, strategies and tools that would easily empower consumers will encourage practices in order to reduce exposure risks. This will result in an enhanced consumer driven food safety. In return, the number of food-borne diseases and intoxications

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

should be reduced contributing to a holistic approach in a farm-to-mouth food safety framework.

Scope: Coverage of both biological and chemical hazards where consumer intervention can be significant in reducing food safety risks. Experimental and field characterisation of the impact of consumer practices, including manipulation of its close environment, in the fate of food-borne hazards and their related risks. Robust estimation of the contribution of post-purchase consumer practices to reduce and/or increase burden of food-borne infection and/or intoxication and exposure to chemical hazards. Development and validation of novel and innovative strategies, programmes and tools in order to empower consumers in the mitigation of biological and chemical risks from food-borne hazards. Transdisciplinary research and multi-actor approaches, including input from social sciences and humanities, are necessary to engage consumers at large.

Type of action: RIA

SFS - 47.[2016] IMPULSE: Impulsivity and compulsivity and the link to nutrition, lifestyle and the socio-economic environment

Specific challenge: Impulsivity (including 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 behaviour can have an important negative impact, e.g. in schools and at the workplace, in families, homes for the elderly as well as in prisons, in the sports stadium and on the street. Many aspects influencing such often uncontrolled behaviours are still not understood as the risk and protective factors or the distribution of risks between inherited factors and nutritional habits gained in young age. Recent studies have suggested that a change in diet and lifestyle can result in a significant reduction in impulsive, compulsive, aggressive or antisocial behaviour.

Scope: The project shall deliver new insights into the influence of diet, the sugar metabolism, fat and protein content, vitamin and mineral balance, amino-acids and food additives, lifestyle and the socio-economic environment on these behavioural disorders, in various population groups (including children, teenagers and the elderly) and propose solutions to this challenge. The gender dimension of these behavioural disorders shall be taken into account. An innovative research approach in support of this area requires the inclusion of many players from different disciplines. Pharmaceutical treatment of behavioural disorders is not foreseen in this call.

Type of action: RIA

SFS - 48. [2017] OBESITY: How to tackle the obesity epidemic?

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

Obesity is a gateway to many other chronic diseases such as type 2 diabetes, cardiovascular and heart diseases and cancers as well as a multitude of adverse social and psychological

conditions affecting quality of life, mental health, physical, and health care costs as well as the efficiency of the workforce. Weight stigma may contribute to reduced employment opportunities and decreased access to preventive health cares and insurances. Alternative approaches and/or tools to study key components of energy balance and to assess the severity of obesity and healthiness that go beyond the BMI, could be relevant.

A wide range of factors interacting at various different levels (e.g. biological, demographic, psychological, socio-cultural, environmental and governmental levels) are known to influence obesity. To address the complex on-going obesity epidemic challenge, experts from different disciplines need to work together with new ways of thinking to solve this societal challenge and use their combined knowledge to provide the most innovative research ideas. There is a need to broaden the view on obesity by looking at the role of national initiatives (such as motivational programmes with incentives), interventions and influence of deliberate manipulation of the environment on the food choice and by critically evaluating the potential of choice architecture, behaviour change, and various forms of policy development and regulation.

Scope: The aim is to reduce effectively obesity, to improve public health and to develop a healthier and sustainable behaviour within the context of sustainable economic growth. This requires a multidisciplinary approach that brings together academics, policy makers and the food and drink industry. A multidisciplinary approach combining for example genetic, bio-molecular, physiological, nutritional, behavioural, educational, environmental, socio-economic, psychological, cultural and other relevant expertise is necessary to better understand the complex interaction between these factors influencing obesity in individuals and populations. Building on existing research, holistic and appropriate intervention studies are needed in order to clearly demonstrate the effects of the different factors. The gender dimension shall be taken into account. In line with the strategy for EU international cooperation in research and innovation, international cooperation is encouraged, in particular with the US, Australia, New Zealand and Canada.

Type of action: RIA

SFS - 49. [2017] SWEET: Sweeteners and sweetness enhancers

Specific challenge: Over the last decades, sweeteners and sweetness (flavour) enhancers (S&SE) have become key ingredients in food produced, consumed and exported to and from the EU. Because of their diversity (natural vs. artificial, geographical origin, processing, caloric content, etc.), S&SE are used in different foodstuffs, dosages and food processes. 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, their production and/or processing (cost) efficiency, safety and quality risk/benefit assessments (single or combined use), and their sustainability (e.g. environmental footprint). The interaction of all these factors influences the role of S&SE in a healthy diet and the fight against obesity. Therefore, further clarification of the health-related aspects of S&SE needs to be further investigated, taking into account environmental sustainability.

Scope: Focus on health and obesity (clinical trials of new and/or emerging S&SE (including combined use) and comparison with existing ones). Explore the sustainability of the whole value chain (ingredient sourcing, production / processing, market opportunities of new and emerging S&SE). Disseminate to health stakeholders as well as the food industry, incl. SMEs.

Type of action: RIA

Call for Blue Growth - Demonstrating an ocean of opportunities

In a context of growing demand for resources and competition, sustainably capturing and demonstrating the potential of seas and oceans is critical to turn this potential into an asset for Europe with long-lasting economic, social and environmental benefits. Targeted innovation in our seas and oceans can play a key role to tackle global challenges such as the scarcity and vulnerability of strategic resources (i.e. for food, energy, etc), while factoring in the climate change risks. This has the potential to provide more jobs, growth, renewable energy sources as well as climate-smart solutions. However, a risky environment, insufficient knowledge, data or data access, as well as uncertain financial and legal frameworks represent 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' while avoiding costly duplication of efforts.

This Focus Area will fully address cross-cutting marine and maritime research as specifically called for in the Specific Work Programme of Horizon 2020. It will bring technologies to readiness level for commercial applications and will strengthen the existing European marine observing, surveying and monitoring capability 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.

The Blue Growth Focus Area WP 2016 – 2017 is based on three interlinked pillars, all of which include mainstreaming of skills and competence development:

1. Innovation for emerging Blue Growth activities: the objective is to test, demonstrate, scale-up and bring to the market existing or new marine and maritime technologies, support innovative products and the development of new services.
2. Healthy oceans and seas for healthy people: the objective is to explore the interactions between the oceans and human health, including land-sea interactions¹.
3. Strengthening the European ocean observing, surveying and monitoring capability: the objective is to create an inter-operational ocean and sea basin observation system, as well as the development/deployment of technologies necessary to accelerate the production of a high-resolution map of EU Sea Basins.

This Focus Area contributes to implement the EU Strategy for international cooperation in research and innovation¹ and other commitments made, such as the Galway Statement (the Arctic), the Blue Med initiative and cooperation with ASEAN countries in the field of aquaculture.

This Focus Area has cross-cutting activities with other areas of Horizon2020, such as *Secure, clean and efficient energy* (Societal Challenge 3), *Smart, Green and Integrated Transport* (Societal Challenge 4) and *Climate action, environment, resource efficiency and raw materials* (Societal Challenge 5).

¹ *Regarding land-sea interactions, one topic on blue green innovation for clean coasts is included under the Blue Growth Call and another topic on coastal-rural interactions to mitigate the impact of land-based activities on coastal water quality is included under the Rural Renaissance Call.*

Corresponding to these three sub-areas, proposals are invited against the following topics:

Innovation for emerging Blue Growth activities

BG - 1. [2016]: Large-scale integrated algae biorefineries

Specific Challenge: Despite the large potential of algae as a production platform, the implementation is still limited, mainly due to unfavourable economics. Costs of algal biomass production need to be reduced and scale of production needs to be increased significantly so that multiple value-added products are obtained in an economically feasible manner. Cost-effective large-scale integrated biorefineries are essential for the further development and scaling-up the algal biotechnology sector.

Scope: The proposals should test, demonstrate, scale-up micro- and macro-algae production and bring to the market existing or new marine and maritime technologies and to develop a range of value-added products (food, feed, pharmaceuticals, cosmetics).

Type of action: IA

BG - 2. [2016/2017]: High value-added specialised vessel concepts enabling more efficient servicing of emerging coastal and offshore activities

Specific Challenge: Costs at sea are higher than equivalent shore based operations. This is partly due to inappropriate support vessels with limited weather windows, high overhead, slow speed, low efficiency and ineffectiveness. There is a need for specialised, economically viable vessels to more effectively serve coastal and offshore activities supporting Blue Growth and employment.

Scope: The topic will support development and testing of specialised vessel concepts (entire systems including hull, on-board equipment, propulsion, etc.) that will reduce costs and enable more efficient operations within either coastal environments or offshore.

Proposals should address one of the following issues (A) and (B).

A. 2016 - Specialised vessel for coastal activities (2016)

B. 2017 - Specialised vessels for offshore activities (2017)

Type of action: IA.

BG - 3. [2016]: Multi-use of the oceans marine space: compatibility, regulations, environmental and legal issues

Specific challenge: Combining several activities in the same marine space, including multi-use platforms is more efficient, reducing infrastructure costs and demand on marine space. A barrier is the different regulatory regimes and practices applied across different sectors and jurisdictions. There is a lack of common understanding of operational needs and the possible synergies.

Scope: The proposals should carry out an overview of all barriers and develop an action plan to overcome these challenges. It is expected that all relevant stakeholders including industry, regulators and governmental organisations are involved in this action.

Type of action: CSA.

**BG - 4. [2017]: Multi-use of the oceans marine space, offshore and near-shore:
Technological Barriers**

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 is more efficient, reducing infrastructure costs and demand on marine space. However, before reaching a demonstration pilot stage, this still requires technological research and innovations to further develop the synergies between sectors and increase the economic viability while reducing the risks for operators and investors in terms of installation and regular operations.

Scope: Proposals should develop combinations of innovative, cost-effective technologies and methods including automation and remote monitoring technologies in a multi-use approach in order to further promote synergies to increase the economic benefit and reduce the environmental impact. Concepts may be based upon a modular approach and address flexibility to ensure feasibility of operational co-location of several maritime activities on a same marine space positioned either with coastal or deep sea environments. Economic benefits should also be investigated.

Type of action: IA

BG - 5. [2017]: ERANET COFUND on marine technologies

Specific Challenge: Targeted innovation in our seas and oceans can play a key role to tackle global challenges such as the scarcity and vulnerability of strategic resources and unlock the potential of the blue economy, while factoring in the climate change risks. EU intervention is needed to create the condition for mobilising investment while avoiding costly duplication of efforts.

Scope: Proposals should address technologies for environmentally friendly and safe waterborne transport, offshore and sub-sea activities and applications to biorefineries and desalination plants. The focus will be on reduction of underwater noise and emissions, improved and novel recycling-oriented production technologies and processes, new materials (anti-fouling and anti-corrosive, biodegradable plastics) and sensor developments, including for deep sea environment. The main objective of this ERA-NET is to promote the alignment with national research programmes and to pool the necessary resources from them to implement a trans-national joint call in the above areas seeking synergies with the Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans).

Type of action: ERA-NET COFUND

Healthy oceans and seas for healthy people

BG - 6. [2017]: Effectively managing the interaction between humans and the oceans and seas: factors impacting healthcare and wellbeing.

Specific Challenge: The interaction between humans and oceans and seas is a broad domain with key impacts on human health and wellbeing and yet it remains fragmented, poorly understood and underexploited. There is a need to coordinate research knowledge across Europe about the benefits and risks of the interaction so as to structure a strategic research agenda on Oceans and Human Health and formulate pan-European evidence-based recommendations supporting more effective, relevant EU policies.

Scope: Proposals should bring together relevant stakeholders across Europe in order to generate, aggregate and mine data pertaining the link between oceans and human health. Proposals should structure a multi-stakeholder forum that enables a better understanding of the potential health benefits from marine and coastal ecosystems, contributing to reduce the burden of disease caused by marine-degraded environments and enabling a more effective anticipation of new threats to public health.

Type of action: CSA

BG - 7. [2016/2017]: Blue green innovation for clean coasts and seas

Specific Challenge: Debris, chemical and microbial pollution, and blooms of algae and jellyfish are a huge and increasing problem in the oceans, seas and coasts. There is a pressing need to develop powerful innovative methods and/or machinery to prevent pollutants from arriving to the ocean, to support large scale removal and to even exploit the removed material in order to offset the removal cost and avoid waste.

Scope: The proposals should be for demonstration projects to clean and restore healthy oceans and seas and their coasts from visible and invisible litter and pollutants, taking account of the climate change impact on selected areas and covering several regions including enclosed seas such as the Mediterranean. The proposals should consider best practices for prevention, traditional clean-up and treatment schemes to open innovation and innovative partnerships. Social acceptance and economic impacts of measures envisaged should also be assessed.

Type of action: IA

See also the topic on "Coastal-rural interactions: enhancing synergies between land and sea-based activities" under the Rural Renaissance Call.

BG - 8. [2016]: Innovative sustainable processing solutions for improving the safety and dietary properties of fish and seafood

Specific Challenge: Seafood processing industry contributes substantially to food security, employment and trade in the regions where the activity takes place. Addressing the sustainability of the fish processing industry involves not just innovative technologies which

could mitigate environmental damage but also its economic viability and consumer imperatives behind them. One way of ensuring the sustainable production of nutritious and safety fish products is through demonstration and first application in the market of eco-innovative, sustainable processing solutions of marine- and aquaculture-derived foods and nutrients.

Scope: Proposals should build on the state-of-the-art research insights (from EU-funded and other projects in this field) with a specific focus on food safety and aiming at generating new knowledge to develop commercial solutions for improving the economic sustainability of the food processing systems while contributing to the quality and safety of the products. For that proposals should comprise activities such as prototyping, testing, demonstrating and piloting in a (near to) operational environment, as well as experimental production, all with a view to paving the way for subsequent market replication and uptake by consumers. Proposals may take into account the impacts across different geographical locations, populations segments, and body systems, as well as the specificities of different types of seafood. Traceability and certification of EU seafood products and labels of quality should be conveniently addressed.

Type of action: IA

Strengthening the European ocean observing, surveying and monitoring capability

BG - 9. [2016]: Integrated Arctic Observing System

Specific challenge: The Arctic is the theatre of profound transformations. Climate change is deeply impacting on the sea-ice extension, on ice-sheet melting, on permafrost thawing, and on ocean and land ecosystems. These changes are bringing with them both risks and opportunities, and an integrated Arctic observing system is becoming essential for studying and assessing changes as well as for governing the sustainable development of the region.

Scope: The proposals should create an Arctic integrated observing system to provide data and services in view of improving the assessment and prediction capabilities of a number of key issues.

Type of action: RIA

BG - 10. [2016]: Impact of Arctic changes on weather/climate of northern hemisphere

Specific challenge: Changes in the Arctic system influence the weather patterns and long-term climate change in the Northern Hemisphere. Europe, as well as North America, is particularly affected by such changes and understanding those changes and their linkages is necessary for developing better prediction tools for weather and climate in Northern latitudes and managing the associated risks

Scope: proposals should contribute to better understand the processes affecting changes in the Arctic climate and assess their impact on Northern hemisphere's weather and climate including risks related to changing weather patterns, extreme events, droughts and flooding.

Type of action: RIA

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

Specific challenge: The Arctic is particularly affected by global warming. Glaciers and ice-sheets are melting, sea ice is diminishing and permanently frozen ground is thawing. The opening up of new transport routes and previously inaccessible natural resources magnifies the geo-political and geo-strategic importance of the Arctic, while new economic opportunities and local environmental challenges and threats need to be thoroughly assessed.

Scope: Proposals should assess the impact of global warming on Arctic (natural and human) systems and their effect on availability/accessibility of resources and the growth of new economic activities, considering needs of local populations and the economic actors operating in this vulnerable region, in view of sustainable development. Actions should address key processes of change and develop appropriate adaptation and mitigation responses.

Type of action: RIA

BG - 12.[2016]: Improve observing systems and operational oceanography capacities in the Mediterranean

Specific Challenge: Harmonising observing systems and operational oceanography capacities in the Mediterranean in order to improve interoperability monitoring, security and safety of people and goods at sea

Scope: The proposals should contribute to improve the observing system efficiency related to the coastal zone and open sea in the Mediterranean; develop and optimise Integrated Mediterranean Observing Systems based on existing infrastructures, and link to international initiatives (e.g. Global Ocean Observing System, Global Ocean Sea Level).

Type of action: RIA

Horizontal Activities in Blue Growth Call

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

Specific Challenge: Addressing relevant challenges of the Mediterranean area towards its economic, environmental and societal sustainability, calls for a stronger knowledge basis that

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

requires the coordination of marine and maritime research and innovation activities leveraging on past and ongoing regional, national and EU initiatives.

Scope: Proposals should deliver a long-term strategic R&D plan towards a sustainable prosperous Mediterranean area integrating policy, industry (including aquaculture), research and society, taking into consideration previous initiatives (e.g. SEAS-era ERANET). Actions should support the "blue Med" Initiative³ which aims at coordinating the research and innovation activities to support a new sustainable approach to manage and exploit the potential of the Mediterranean Sea in the marine and maritime sectors.

Type of action: CSA

BG - 14.[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 (related applications, key tools and technologies including those related to the link between oceans and human health) as well as aquaculture (marine and fresh water) related technologies and services.

Scope: SME instrument phase 1 (feasibility assessment) and phase 2 (innovation project) and phase 3 (commercialisation)

Type of action: SME instrument

³ Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area – The BLUEMED Initiative

Call for a Rural Renaissance - Fostering innovation and business opportunities

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 and public goods and ecosystem services providing long-term benefits for the whole society. At the same time they are affected by a series of demographic, economic and societal developments such as urbanisation, depopulation, business relocation and ageing. The call will support a "rural renaissance" by lifting the natural, social, cultural and economic potential of rural areas as well as fostering policy coherence. It will aim at boosting economic development, environmental services and entrepreneurial innovations – in particular in SMEs- in rural and coastal areas. This will be achieved by building on diversification and modernisation strategies, 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 aim at improving policies and governance at various geographical scales to foster sustainable growth in rural areas. They will cover such aspects as territorial linkages, 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: fostering sustainable growth in rural areas will be sought through the development of new services, products and value chains, taking advantage of technological and non-technological innovations and exploring possibilities for greater cross-sectoral synergies.
- Innovation and skill development: activities directed at knowledge and innovation systems, education and training, advisory services and entrepreneurial skills will enhance the capacity of rural dwellers to mobilise new knowledge and technologies for the development of their activities. In addition, activities will aim at fostering the delivery of policies regarding innovation and will contribute to the implementation of the European Innovation Partnership "Agricultural Productivity and Sustainability".

Actions in this area will contribute in particular to the objectives of European Structural and Investment Funds, including Rural Development within the Common Agricultural Policy (CAP), the Innovation Union, recent developments on rural-urban partnerships as well as energy and climate policies.

Corresponding to these three sub-areas, proposals are invited against the following topics:

New approaches towards policies and governance

RR – [2016] - Consolidated policy framework and governance models for synergies in rural-urban linkages

Specific challenge: Increasing urbanization along with transformation of rural economies results in new types of rural-urban interactions and dependencies, to which policies and governance approaches are not fully adapted yet. Consolidated evidence is needed to assess the importance of these interactions on rural growth and understand, in concrete and operational terms, how linkages and dependencies between urban and rural activities affect creation of value added and jobs. A consolidated conceptual framework is needed to tailor policy interventions at different scales aiming at maximising rural job and growth creation thanks to synergistic interactions.

Scope: Proposals should consolidate a conceptual and policy framework adapted to the diversity of European situations. They should analyse how rural areas interact with other areas, exploring endogenous conditions which enable them to interact and quantify the importance of these connections for the rural economy. Through operational case studies, proposals should analyse the practical linkages between rural and urban activities, looking at mutual dependencies, competitive or synergistic relationships, describing the institutional and policy context and its influence. Participatory research should pinpoint concrete opportunities and bottlenecks for greater synergies. They should assess the effectiveness of different governance approaches and derive a set of governance models and tools catering for better economic development and modernisation of service delivery in rural areas. Proposals should fall under the concept of 'multi-actor approach'.

RR – [2017] – Coastal-rural interactions: enhancing synergies between land and sea-based activities

Specific challenge: This topic wishes to explore how territorial governance approaches and cross-sectorial economic development approaches could deliver mutually beneficial impacts for both rural territories and coastal areas/seas which cannot be achieved in other ways, in particular in the field of mitigating impact of land-based activities on coastal water quality.

Scope: Proposals should undertake an analysis of positive and negative externalities of land and sea activities on one another at regional scale. They should look at incentives and barriers to greater collaboration, identify promising business models enabling synergies between land-based and sea-based activities and useful governance approaches which in-fine are likely to encourage greater cooperation and reduce negative externalities. Proposals should fall under the concept of 'multi-actor approach'.

Instrument: RIA

See also the topic on "Healthy oceans and seas for healthy people" under the Blue Growth Call.

RR - 1. [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 considerably evolved in the last few decades as underpinning objectives have widened to meet societal needs (food security, environment, climate change, etc.). This has, however, taken place in a fragmented and incomplete manner. To ensure sustainable management of natural resources in the long term it is necessary to adopt an integrated framework which deals in an appropriate manner with all the objectives of the society in view of incentivising actions / behaviours / investments contributing to desirable targets. The implementation of such an integrated approach needs to be accompanied with appropriate decision support tools.

Scope: Activities will take place at various geographical scales reflecting levels of policy / use relevance, from regional to EU levels. Investigations related to both policy and decision tools will take place in a full-fledged participatory manner so as to reflect the empowerment of the society at large into the process. Policy development will take account of all current and expected major societal needs regarding natural resources and their use in terms of products and other types of goods. Decision tools will help prioritize multiple resource uses (e.g. land use, water) at different geographic scales (meso level and related regional strategies + national/EU level for general policies) taking advantage of existing databases and tools. Activities will cover agricultural and forestry land.

Type of action: RIA

RR - 2. [2016]: WATER FARMS – Improving farming and supply of drinking water

Specific Challenge: The quality of drinking water, which matters a lot to EU citizens, and the level and cost of treatment to be applied prior to consumption very much depend on the quality of ground water and surface water which are used to produce it. This is partly why the Water framework Directive puts a high emphasis on the level of protection of water resources, in particular groundwater and surface water. Diffuse pollution of water sources by farming systems clearly remains an obstacle to achieving the objectives of the WFD which has been addressed with varying success by current policy tools.

Scope: Proposals shall work on a variety of case studies identifying best practices in the field of fresh water management involving improved farming systems. They shall undertake a cost-benefit analysis for society of different options for delivery of high-quality drinking water, comparing preventive and curative options. Transition pathways from "paying treatment for depolluting" options to "rewarding quality water delivering farming systems" options shall be investigated. Governance models including both private spring water companies and public water supply bodies will be investigated while screening the impact on other ecosystem services. Case studies should be selected to cover a variety of soil and climate conditions, contrasted legal frameworks, take into account different temporal and spatial scales and cover larger and smaller water collection areas, including rural and urban areas or only rural areas. The project should deliver improved public policy instruments, models of contractual arrangements, improved monitoring and control tools as well as transparent and understandable indicators.

Type of action: RIA

RR - 3. [2017] ECOSYSTEM: Novel public policies and business models for sustainable supply and payment of forest ecosystem services

Specific challenge: Regional differences regarding forestry production systems and long production cycles are landmarks of the forestry sector. Forests generally provide for a series of goods and services, some valued (i.e. wood and non-wood products), some non-valued on the existing markets (i.e. ecosystem services crossing the administrative barriers). Of the latter, some fall in the 'public domain' (i.e. non-excludable and non-rivalry in consumption), such as C sequestration or landscape, while others are 'common-pool resources' (i.e. non-excludable but rivalry), such as recreation or water supply. The regulatory framework consists of both forest policies and forest-related policies (e.g. climate, biodiversity, energy), which are not necessarily mutually reinforcing. As such, responsibilities on forest policies range from EU level (e.g. monitoring, protection, LULUCF reporting, etc.) to member or federal states (e.g. inventory, planning, management, etc.). In case of policy/market failure – a recognised threat, 'open access' and suboptimal provision of ecosystem services are the undesired outcomes. A sustainable provision of ecosystem services therefore implies, besides policy coordination, novel policies and business models. While the assessment of economic value of forest ecosystem services has been addressed by recent studies, there remains significant room for further operationalizing this knowledge in practice.

Scope: Proposals should aim at novel public policies and business models to 'internalise' the proven values of forest ecosystem services ('externalities') and contribute to their sustainable supply, given the multifunctional role of forests EU wide. They should consider the holistic basket of economic, social and environmental services, and the trade-offs thereof, and aim at closing the gap between academic work, associated policy recommendations, and practice on the ground. Means to design and implement, at the appropriate level of forest management/administration, mechanisms of payment for ecosystem services (PES), are specifically aimed at. Pilot testing of the proposed mechanisms, which may combine public policy tools with business models, are encouraged. Proposal should fall under the 'multi-actor approach'/public engagement.

Type of Action: Innovation Action

New value chains and business models

RR - 4. [2016] Crop diversification systems for the delivery of food, feed, industrial products and ecosystems services: from farm benefits to value-chain organisation

Specific challenge: Crop diversification in time and space through rotations and associations allowing low-input agronomic practices are drivers for resource-efficient farming systems which can fulfil the need for producing at the same time 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 perform field experiments of diversified cropping systems with different species, agronomic practices, and locations in Europe over several years with the objective of optimising the use of resources and increasing the global yield on a farm and/or the Land Equivalent Ratio. The diversification of crops should be investigated via growing different crops on the same land in successive growing season or within a growing season, and growing different species in proximity in the same field (mixed intercropping or in rows).

Proposals should perform technical, economic, social and environmental evaluations of field experiments. The proposals should also investigate how the downstream value-chains and the different actors involved should organise themselves so that the harvested crops and residues/co-products access the market for food, feed and industrial products. Proposals should fall under the concept of "multi-actor approach". Dissemination activities should plan field visits and produce end-user materials to feed the EIP-AGRI. Selected projects should closely liaise with complementary activities funded in response to call topic SFS on mixtures and associations in cropping systems.

Type of action: RIA

RR - 5. [2017] Resource-efficient and profitable industrial crops on marginal lands

Specific challenge

Industrial crops 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, the development of resource-efficient varieties which can grow on marginal lands (i.e. areas facing natural constraints, low soil productivity or poor climatic conditions) while generating technical and economic benefits should be promoted.

Scope

The 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/disseminate this tool to end-users (e.g. farmers, industry) and perform an analysis of best practice cases of industrial crops deployment. The proposals should map the most appropriate marginal lands in Europe to be farmed with industrial crops while taking account of socio-economic and environmental considerations. Gaps and barriers (e.g. knowledge, practice) for the use of those marginal lands for industrial cropping should be identified. The proposals should also further improve the technical, economic and environmental performance of the most promising industrial crop species on marginal lands notably via breeding and low-input agronomic practices. Proposals should fall under the concept of "multi-actor approach".

Type of action: RIA

RR - 6. [2016] Demonstration of integrated logistics centres for food and non-food applications

Specific challenge: Most of agro-industries are surrounded by agricultural/forestry residues and industrial crops and usually produce by-products that could be used as bio-commodities for industrial applications (e.g. biochemicals, biomaterials, bioenergy). These agro-industries work seasonally and could diversify their regular activity during non-productive periods by organising the logistics and pre-treating of local biomass creating synergetic logistics centres for food and non-food uses.

Scope: The proposals should demonstrate the technical and economic feasibility of integrated biomass logistic centres for food and non-food products under real operation conditions, taking advantage of seasonal activity of agro-industries. The logistics centres should develop cost-effective and environmentally-friendly logistics for harvesting (e.g. specific machineries), transport, storage (e.g. avoiding GHG emissions) and pre-treatment (e.g. biomass densification) of surrounding agricultural/forestry residues and/or industrial crops while using the existing facilities/equipment of agro-industries to reduce overall logistics costs. Proposals should also investigate the possibility of treating agro-industry by-products to

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

bio-commodities for industrial applications. Environmental (e.g. effect on soil compaction and organic content, effect on road transport traffic), economic (e.g. economic viability and added value for farmers and agro-industry) and social impact of the integrated logistics shall be assessed. At least two demonstrations of logistics centres in different MS should be performed.

Type of action: IA

RR - 7. [2016/17] Creating added value from waste and by-products generated on farm and along the value-chain

Specific challenge: Agriculture and agro-industries generate waste streams and by-products (e.g. manure, effluents, losses and by-products of plant/livestock production at farm level and down the chain) that are not properly valorised and can bring economic and environmental benefits. A broad range of innovative technical solutions for improved logistics and conversion technologies should provide environmentally friendly, secure and profitable business cases for SMEs contributing to a sustainable circular economy. These innovative solutions include improved existing routes to biogas/bioenergy, high quality feed and fertilizers and also new processes for the production of high added-value products which can be used inside or outside the agricultural sector. A combined use of different waste/by-products and/or a multiple output is also considered.

Scope

Standard text for all SME Instrument topics

Type of action: SME Instrument

RR - 8. [2017] – Business models for modern rural economies

Specific challenge:

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 diversified jobs as well as resilience to global economic and climate changes. Increased interest in regional and local economy, resource-efficient and low carbon value chains generate opportunities to rethink and improve value chain organisation in a way that will turn specific assets into economic, environmental and social benefits.

Scope:

Proposals shall identify innovative business models which are developing in rural areas, have an important potential for creation of added value, social cohesion and jobs and which are likely to be up-scaled or replicated to a multiplicity of other areas. Socio-economic analysis should identify, describe and benchmark different business models in terms of starting conditions, enabling factors, generation of added value and jobs as well as other potential benefits and repartition of the created value, exploring the concept of shared value. Particular attention shall be paid to models which foster a more sustainable mobilisation of resources, improved cooperation between different operators along the value chain and/or across traditional and developing sectors (e.g. via clusters/platforms), and lead to new products or services, recycling or up-cycling of materials. Food, bio-based value chains as well as other

forms of rural businesses or services, in particular around digital technologies should be considered. Proposals should fall under the concept of 'multi-actor approach'.

Type of action: RIA

Innovation and skill development

RR - 9. [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 practice, and innovative ideas and methods from practice are not captured and spread. The Agricultural Knowledge and Innovation Systems (AKIS) of different countries and sectors 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. Mechanisms and networks for cooperation between researchers, advisors, farmers/foresters and other actors in the supply chain, which stimulate knowledge exchange, need to be developed in view of optimising resource use and to enhance 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) as they foster knowledge exchange at cross-border level, and may enable links between the EIP-AGRI Operational Groups supported under rural development programmes.

Scope:

Activities include synthesising, sharing and presenting existing best practices and research results that are near to be put into practice, but not sufficiently known by practitioners. The activities should on the one hand help to put existing research into practice and on the other hand capture and share best practices, ideas and methods from entrepreneurial practitioners in agriculture and forestry. The specific themes of the networks may be chosen bottom-up. They must focus on the most urgent needs of specific sectors or develop important or promising cross-sectorial or issues where primary production needs to improve linkages to the supply chain. A comprehensive description of the state of the art on the theme should show the added value of the project proposal, the relevance of the theme chosen and avoid duplication with existing networks. The networks shall involve a wide range of actors, covering both science and agricultural/forestry practice on the specific themes, e.g. relevant scientists, farmers/farmers' groups, advisory services, innovation support services, various EIP Operational Groups and interactive innovation groups operating in the context of the EIP-AGRI, enterprises or other supply chain actors involved in the theme chosen. The resulting innovative knowledge and 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 practice. In the exceptional event that further 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 'multi-actor approach'.

Type of action: CSA

RR - 10. [2016]: Mapping, describing and building links between open commercial farms

Specific Challenge: Improving the sustainability of European farming systems and facilitating their transition is a key objective of both the CAP and Horizon 2020. R&I activities can play a key role in the transition effort towards sustainable and resilient production systems by providing support to demonstrate the validity of the innovative approach to the farming community. It is recognised that other farmers are the key source of information for farmers and their experience and opinion is often decisive for their peer farmers. Therefore demonstration and pilot farms have a major role to play in the diffusion of innovative farming approaches to the farming community. Efforts are needed to explore the potential of demonstration and to connect existing initiatives of open farms at local level. This would step up learning from each other and improve linkages throughout the EU. This activity should lead to a better view on the impact that can be reached by deepening demonstration activities and the practical approaches that are effective to do so.

Scope: Activities should map and describe open farms in Europe with a representative geographic coverage for the wide range of agricultural sectors and activities and provide for networking possibilities on specific themes/topics. Based on this inventory of open farms, project proposals should analyse the different types of demonstration programmes in a commercial farm setting, including where they are combined with experimentation, looking at what they do, how and what is their impact. To deepen the understanding of effective demonstration activities, consortia shall involve a wide range of actors, covering both science, intermediaries and agricultural/forestry practice, e.g. scientists, farmers/farmers' groups, advisors, innovation support services, and enterprises or other supply chain actors if relevant. Project activities should result in improved links between open farms in Europe, a better view on approaches and policies to incentivise effective demonstration activities, and explore the potential to provide added value in this regard to the European Innovation Partnership "Agricultural Productivity and Sustainability", its network and its Operational Groups ".
Proposals should fall under the 'multi-actor' approachInstrument: CSA

Type of action: CSA

RR - 11. [2016/2017]: Benchmarking sustainable farming systems: a role for farm networks

Specific Challenge: There is a significant need for generation of a wide range of data to characterise and benchmark sustainable farming systems under various socio-economic and pedo-climatic conditions in Europe.

Scope: Activities will target farming systems with a clear aim at coping with all dimensions of sustainability (environmental, economic and social). Activities will include the collection of relevant bio-physical and socio-economic data which are necessary to monitor, benchmark and analyse the performance of these farming systems in a variety of dimensions. Proposed networks will be stratified so as to reflect relevant European pedo-climatic and socio-economic conditions. Attention will be paid to experimental stations, experimental farms and,

as relevant, commercial farms. Activities need to look at both production of references and at detection of innovative approaches.

Type of action: RIA

RR - 12. [2017]: Networks of demonstration farms on specific themes

Specific Challenge: Existing initiatives of demonstration farms in specific thematic areas need to be connected and networked within Europe in view of doing more with less. Demonstration and pilot farms have a major role to play for the broader farming community with regard to knowledge exchange on practical farming approaches. They are also a perfect instrument for dissemination of innovative approaches. Condition for effective peer to peer learning is that the demonstration farm operates within the same conditions as average commercial farms. This means that the farm is subject to normal regulatory constraints and that the alternative production systems / agricultural practices / technologies are an integral part of the commercial farming activity. Demonstration on “real” farms also offers, beyond classical knowledge transfer activities, opportunities for actors to meet. As such, demonstration farm networks should develop increased interaction between science and practice, for instance reflect on research outputs, capture additional research needs from practice, and provide a base to develop interactive innovation projects on the needs or opportunities of the farming community.

Scope: Project activities should set up networks between demonstration farms on specific themes across Europe and exploit their potential to improve delivery of practice oriented knowledge and interactive activities. Themes may cover or cluster for instance soil/nutrient/crop/biodiversity/landscape/supply chain management, resource efficiency, various environmental/climate farming challenges, integrated pest management, early detection systems, animal welfare, effective, resilient and biosecure livestock systems, resilient cropping, energy production and management, speciality crops, biomass applications etc. Projects should provide for means to exchange knowledge and set examples among demonstration farms in an approach appealing to an average farmer, e.g. farm visits, visual material (photos, video), easy to read texts, etc. The demonstration networks should also develop linkages with advisors and their activities. The project activities should provide synergy and complementarity to the European Partnership "Agricultural Productivity and Sustainability" and its Operational Groups, by showcasing innovative practices/methods and promoting the common format for practitioners⁴. They should also seek added value to the outputs from relevant European, national and regional projects ⁵. Activities may extend for periods longer than 3 years if appropriately substantiated. Proposals should fall under the 'multi-actor' approach

Type of action: CSA

⁴ The common format for practitioners is available on [www. Eip. Zzz.eu](http://www.Eip.Zzz.eu)

⁵ See EIP website www.xxx.yyy.eu for the list of thematic networks

RR - 13. [2017] – Future-proofing the agriculture and rural science and education system

Specific challenge: Transition towards more sustainable agriculture, food and bio-based industries and rural economies, equipped to face the challenges ahead of them, requires a renewal and strengthening of technical and soft skills of all actors involved, along with an enhanced capacity to deliver well recognised and peer-reviewed practice-oriented research, overall contributing to an efficient interactive knowledge system.

Scope: Activities under this topic shall concentrate on education and skills on one side, and on fostering delivery of practice-oriented research on the other side. Proposals will carry-out a challenge-based and foresight-based inventory of skills which are going to be needed in agriculture as well as industry sectors and science, paying particular attention to soft skills along with technical skills, different science fields and integration into multidisciplinary curriculum. They will assess whether current education and training systems cater for these needs and propose approaches for improvement. Proposals will also elaborate operational methods for incentivising and reviewing outputs of practice-oriented research, producing a practical peer-review system and proposing ways for measuring performance and rewarding researchers involved in such activities. Involvement of education and science institutes as well as actors from agricultural practice and industries from a variety of Member States should be secured to guarantee the impact of the project, which falls under the concept of multi-actor approach.

Type of action: RIA

RR - 14. [2016/2017]: Advisor's role in functioning of AKIS and advisory policies boosting innovation in sustainable agriculture

Specific challenge: New approaches need to be developed to enhance of advisors' potential to boost innovation through their intermediate function connecting science and practice. The way advisors are embedded in the country/regional Agricultural Knowledge and Innovation System (AKIS), how public and private advisory services interact and what type/ and combination their financing sources have determines advisors' short and long term presence, their impartiality and how practical knowledge is conserved on the longer term. This interrelationship is steered by public policies at national, regional and EU level and impacts to a growing extent whether the society can sufficiently steer towards improved sustainability of agricultural systems. The role authorities and private industry attribute to advisory services and the expectations they have for fulfilling their own objectives needs exploration if one wants to understand the true functioning of AKIS. The efficiency of an advisory service and its potential effectiveness relies on a long lasting confidence between advisor and farmer, therefore sustainable financing of specific basic functions of the advisory services maybe a key to success. The growing number and impact of private advisors and the decrease of public extension services negatively influences cooperation among advisors, and new ways of cooperation need to be explored, with the ultimate goal to improve AKIS in the various Member States.

Scope: Proposals should deepen advisors' potential for boosting innovation and explore how their various roles may be embedded in the regional, national and EU AKIS. Furthermore

activities should investigate how public and private advisors are interconnected, are competing or well-coordinated, how permanent training is organised and what minimum education requirements are needed for fulfilling the role of advisor. Proposals shall also explore the role of advisors in interactive innovation projects and in innovation networks at local, regional, national or European level (the EU Farm Advisory System, the EIP network, ENRD, Leader, etc.). This action should explore how farmers take their decisions and who influences them the most, considering different types of farmers. Proposals should list the key elements responsible for the creation of trust between farmer and advisor and analyse the impact of public procurement for advisory services under RD funding. Proposals should collect a series of practical cases for discussion with key actors and fall under the concept of 'multi-actor approach.

Type of action: RIA

RR - 15. [2017]: The benefits of working with others – fostering social capital in the farming sector

Specific Challenge: the sustainability of the farming sector relies for an important part on the capacity of farmers to develop activities and participate in networks with fellow farmers and other individuals, groups or other entities. Despite the multiple advantages derived from such approaches, the level of involvement of farmers in such approach can be low in a number of European countries, for various reasons. To facilitate the development of such approaches, it is considered important to investigate the constraints that impede their development and to seek ways to overcome them.

Scope: proposals will cover all EU Member States where the level of organisation of farmers is low. Activities will address constraints to the development of cooperative / networking activities and will elaborate on solutions. These will derive from case studies, identification of best practices, participatory workshops, etc.

Type of action: CSA

RR - 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 new initiatives and instruments for speeding up innovation have recently been established and deserve in depth exploration. With Horizon 2020 and the CAP towards 2020, innovation in agriculture and related sectors has been given specific attention. 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 innovative approach which relies on knowledge exchange, 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. Besides Horizon 2020 multi-actor research projects and thematic networks compiling knowledge ready for practice, other elements of the concerned policies may also contribute to innovation, e.g. the Farm Advisory System, Rural Development supporting advisory services, knowledge and information actions, LEADER, specific national/regional or particular H2020 instruments etc. All instruments cited aim to contribute to innovation in the agricultural and

HORIZON 2020 – WORK PROGRAMME 2016-2017

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

forestry sector. The challenge is to improve their targeting and interlinking - if and where needed - , as well as to 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, this topic should investigate the conception and implementation of interactive innovation projects, based on a substantial number of case studies of interactive projects from each type. An essential part of this topic would go into depth to develop best practices/approaches for H2020 multi-actor projects and thematic networks at project level and seek ways to intensify effective linkages with EIP Operational Groups and other interactive projects. Proposals should involve key actors in the AKIS (farmers, advisors, scientists, enterprises etc.) and fall under the concept of 'multi-actor approach'⁶

Type of action: RIA

⁶ See definition of 'multi-actor approach' in footnote 1 in the introduction of this Work Programme part

Call for the Bioeconomy - Bio-based innovation for sustainable goods and services

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

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

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.

The strategic orientation 'Mobilising stakeholders engagement for new bio-based markets' is tackled in particular under this call. 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).

Securing sustainable biomass supply for bio-based goods and services

BE - 1. [2016] Sustainability schemes for the bio-based economy

Specific challenge: Sustainability assessments are a major factor 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.

Scope: Development of sustainability schemes for bio-based products building on (1) existing schemes for biomass and 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. Aspects to be consider include: building-in economic and social factors; consideration of the circular economy and cascading use; development of ILUC factors for bio-based products; certification schemes and use of standards.

Type of action: RIA

BE - 2. [2017] Towards a methodology for the collection of statistical data on bio-based industries and bio-based products

Specific challenge: The current lack of reliable and uniform statistics on bio-based industries and bio-based products has a negative effect on the ability of policy-makers to set the most appropriate policies to encourage investment in the bioeconomy. In spite of progress made by the European Bioeconomy Observatory and other initiatives, there is no complete uniform methodology for collecting data specific to bio-based industries and bio-based products. This

data gap hinders the development of economic models enabling the quantification of the bioeconomy and its economic effects.

Scope: Development of a methodology enabling the incorporation of bio-based products to 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 should be considered: (1) Interlinks with current CEN standardisation work addressed in CEN on bio-based products (2) Training of official custom and competent laboratories staff in Member States; (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 international databases (e.g. FAOSTAT, PSD, etc); (5) Data generation to feed economic models.

Type of action: RIA

BE - 3. [2017] Plant Molecular Factory

Specific challenge

Plant Molecular Factory is defined as the use of plants or plant cells to produce 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 process. National and regional research programmes in this area are currently fragmented. Based on the necessary critical mass, an ERA-NET Cofund project aims at mobilising national resources in the coordination and alignment of national programmes and activities in the field.

Scope:

Proposals should coordinate national and regional programmes for research in the area of plant molecular farming and pool the necessary financial resources from these programmes, with a view to implementing a transnational call with EU co-funding resulting in grants to third parties. Proposals should also aim at improved collaboration and alignment of national programmes and activities and will provide concrete plans for decreasing fragmentation, for data sharing, for promoting common data elements for the establishment of patent registries, for addressing hurdles for effective coordination, for involving stakeholders and relevant existing initiatives.

Type of action: ERA-NET co-fund

BE - 4. [2016] WOOD: Intelligent solutions and tools in forest production systems, fostering sustainable supply of quality wood for the growing bioeconomy

Specific challenge: The undergoing challenges posed by the increasing societal demands and policies related to forest resources trigger the need to enhance the sustainability of a multipurpose EU forestry. The restocking harvest is known, for the close-to-nature forestry systems at least, as the primordial action toward the new generation of trees. Furthermore, the quantity and the quality of wood depend tremendously on the forestry treatments and measures implemented from the establishment of forest stands until 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 large production cycles and the associated limited capacity to adapt to the evolving framework of environmental and societal conditions.

Scope: Proposals should aim at the development of intelligent (i.e. economic efficient and environment-friendly) and novel solutions and tools for silvicultural measures, applicable for

Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

any phase of the trees/forest lifetime, fostering sustainable production of quality wood, while maintaining the multifunctional role of forests. They should be applicable to a sizeable share of forestry systems in Europe and can refer to a series of technological advancements in relation to measures including, but not limited to, non-destructive measurement/analysis, weeding, cleaning, pruning, thinning, etc. Demonstration of feasibility of these solutions in field conditions, added-value for the wood production and close-to-market outputs are expected.

Type of action: SME Instrument

BE - 5. [2017] BREED: 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 increasingly result in discrepancies between the current distribution of tree species, bound by physical barriers, large production cycles and regulations on forest reproductive materials, and those areas where tree species and provenances could also (or better) grow. Assisted migration of tree species from one region (or continent) to another contributed to increase wood production in Europe over the last centuries. In spite of the examples of good practice and the appreciable genetic variation, there still is limited evidence that tree populations have the inherent capacity to adapt rapidly enough and survive the current pace of environmental change. To meet the growing needs of the bioeconomy, there is need to enhance the resilience of forests to climate change through the selection/development of new genotypes, with appropriate adaptation profiles, to counteract climate-induced decline and maintain/enhance productivity.

Scope: Proposals should aim at the development of novel tree breeding strategies and tools aiming at sustainable yields of biomass (wood and non-wood products), resilience to climate change and natural disturbances, through the identification of genotypes with appropriate adaptation traits and possible extension/change of tree species areas, both vertically and horizontally, including on marginal land. Coniferous and broadleaves species that are of specific importance for forestry EU wide should be targeted. Combining genomic information and traditional methods of genome sequencing and selection of desired traits, with methods of genome improvement, and the analysis of their potential application in tree breeding programmes, could also be considered. Compliance with biosafety and other relevant legislation, and complementary with previous (FP7) projects and COST actions is required.

Type of action: RIA

The following topics are also relevant to the Bioeconomy Call:

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

For the topic text and further information, please refer to the description of the RR-[2016] topic under Rural Renaissance call

RR-[2017] Resource-efficient and profitable industrial crops on marginal lands

For the topic text and further information, please refer to the description of the RR-[2017] topic under Rural Renaissance call

RR-[2016/17] Creating added value from waste and by-products generated on farm and along the value-chain

For the topic text and further information, please refer to the description of the SMEInst[2016/17] topic under Rural Renaissance call

RR – [2017] – Business models for modern rural economies

For the topic text and further information, please refer to the description of the RR-[2017] topic under Rural Renaissance call

Building the "bio-based markets of the future"- mobilising stakeholders engagement

BE - 6. [2016] 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. To improve bio-based uptake and meet citizen's demands, there is a need for a broad, inclusive assessment of the challenges and opportunities at hand, by elaborating sustainable integrated solutions and bringing together a wide range of stakeholders.

Scope: The Mobilisation and Mutual Learning Action Plan (MML) would ensure the engagement of all relevant groups and tackle innovation related challenges by creating partnerships with a variety of perspectives, knowledge and experiences, both in public engagement and in bio-based products, maintaining open dialogue between the different stakeholders. The approach should include applied innovation, better planning, a more participatory approach and awareness raising actions for issues such as better bio-based solutions and uptake.

Type of action: CSA

BE - 7. [2017] Public procurement for Innovative Bio-based products

Specific challenge: The potential for increasing demand for bio-based products through public procurement is huge, as European public authorities spend almost EUR 2000 billion, or 16% of GDP, on goods and services yearly. Many product areas could potentially feature products made entirely or partly from renewable bio-based material. Likewise, many types of services could potentially benefit from bio-based inputs. The use of public purchasing of innovative solutions it is a real opportunity to boost the sustainable deployment of innovative bio-based products in the market.

Scope: The scope of the PPI is to specify, purchase and deploy bio-based products solutions which can deliver sustainable, new or improved services and improve the ecosystem in which procurement approaches for innovative bio-based products solutions are successfully applied. Activities should build on the Network for public procurer on bio-based products launched under H2020. Examples of target innovative bio-based products may include services/applications within construction, furnishing, office and catering supplies, cleaning, personal care, etc.

Type of action: Public Procurement for Innovative products (PPI) Co-fund

BE - 8. [2017] Bio-based industries regional dimension

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 frame. Few regions in Europe are in the process to build successful "bio-based industries" demonstrator case studies, and these have been largely in the regions with established chemical or forestry industries. Strategies and implementing modalities should be shared in particular to regions that have so far 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 the rural renaissance.

Scope: Creation of a platform of regional and local organisations (regional authorities or mandated agencies or clusters) interested to develop 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. Particular attention will be given to fully exploit synergies with ESIF and EIB funding instruments.

Type of action: CSA

BE - 9. [2016] LIFECYCLE: Life-cycle analysis of wood value chains and applications for the bioeconomy

Specific challenge: The forest-based sector now represents a case of relatively self-sufficient value chain in Europe, with a certain tradition of sustainability checks, which makes it essential for industrial development and economic growth. However, forest stands require large production cycles, while the projections of wood demands are steadily increasing. Also, the wood has a number of competing feedstock uses in the bioeconomy, which may or may not be used on a cascading basis (from higher to lower added value products), including bioenergy. To optimise the allocation of natural resources (e.g. land, water, soil, biodiversity) and production means (e.g. labour, capital), forest and wood value chains require a 'systemic' analysis (from 'cradle to grave'), encompassing social, economic and environmental considerations, including climate change mitigation (C sequestration in forest and harvested wood and GHG emissions from processing). This life-cycle analysis needs also to be understood in relation to the evolving framework of natural conditions, societal demands, technological advancements and the policy framework. Optimisation of production and processing considering this broad framework of 'variables' remains a challenging task for decision making.

Scope: Proposals should aim at developing methodologies for the life-cycle analysis of wood value chains in both the traditional woodworking and paper industries and the emerging branches of bioeconomy, which should also consider the sustainability of upstream primary production systems. Specific research questions may include, but are not limited to: the definition of parameters/metrics against which common value chains need to be checked; the tipping points for a 'cascade' to be 'terminated' and replaced by renewed supply from primary sources, in order to maximise resource efficiency and minimise environmental footprint; etc. Methodological work should be based on concrete value-chains and integrated in the European context to enhance their sustainability. Business models covering both primary and secondary sector developed on this basis are also expected.

Type of action: RIA

HORIZON 2020 – WORK PROGRAMME 2016-2017

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

Other actions (not subject to calls for proposals)

OTHER - 1. [2016]: 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 Bioeconomy 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: PP or Named beneficiary (*TBC*)

OTHER - 2. [2016/2017]: Group on independent experts on Bio-based products – EU Future policy and regulatory needs/barriers of innovative bio-based products

Specific Challenge & Scope: An expert group to be created to explore options to identified regulatory hurdles that may inhibit the industrial uptake of bio-based products, key market entry barriers and role that RTD can play to overcome them. The task of the Expert Group will be to collect and analyse information, explore issues, assess policy and operational options, and assist on the preparation of impact assessment and/or life cycle analysis.

Type of action: Expert contracts

OTHER - 3. [2016]: 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.

Type of action: Experts contracts

OTHER - 4. [2016/2017]: Bioeconomy and Blue Economy Window (BioBlueWindow)

Specific Challenge & Scope: The BioBlueWindow targets R&I-driven SMEs and small midcaps^[1] requiring loans of between EUR 25 000 and EUR 7.5 million who are either suppliers and developers of bioeconomy and blue-economy related innovations (commercially available or near-to-market) or end-users of such innovations. To be eligible as final beneficiaries, R&I-driven SMEs and small midcaps must a) be located in Member States and b) satisfy “bioeconomy and blue economy” criteria^[2] that will be specified by the services of the Commission before the launch of the BioBlueWindow.

Subject to the successful outcome of negotiations, the European Investment Fund (EIF) will implement the BioBlueWindow^[3] as a sub-facility within the 'SMEs & Small Midcaps R&I Loans Service'. It will be delivered by financial intermediaries (such as banks), who will extend the actual loans to final beneficiaries. Financial intermediaries will be guaranteed against a proportion of their potential losses by EIF.

Type of action: named beneficiary (*TBC*)

OTHER - 5. [2016/2017]: Inducement Prize on Food Security

Inducement prizes stimulate new and innovative solutions to address the existing and emerging societal challenges that are otherwise rarely pursued via normal grants and business processes in enterprises. 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 are in development.

Type of action: Inducement prize

OTHER - 6. [2016]: Expert group on the interim evaluation of H2020

Specific Challenge & Scope: An expert group will be set up to carry out the interim evaluation of Horizon 2020 for SC2.

Type of action: Expert contracts

^[1] Up to 499 employees.

^[2] Along the lines of undertaking innovations in the areas of investments in processes, products, materials, management, use patterns, skills or training; or in supply-chain measures in the areas of bioeconomy and blue economy.

^[3] Subject to the successful conclusion of negotiations.

Contributions of SC 2 to other parts of Horizon 2020

LEIT-ICT [2016]: Data driven agri-food chains

Specific Challenge: The challenge is to design architectures, based on the Internet of Things (IoT) concept, to "program" each object for optimal behaviour, according to its role in the farm and in the food chain, as means for more sustainable and productive agriculture as well as more transparency and traceability agri-food value chains.

Scope: The proposed activity aims at launching two or three large scale pilots, addressing one or more of three representative farming subsectors (arable farming, horticulture and livestock farming) to demonstrate the benefits from introducing more data driven farm and agri-food systems. Solutions shall build upon the IoT concept taking advantage of existing open architectures, platforms and standards, in order to further demonstrate their applicability in the farm and in the agri-food chain.

Type of action: IA

Smart Cities-[2017] Resource-efficient urban agriculture for multiple benefits

Specific challenge

With increasing urbanisation, urban agriculture can contribute to improve food security and to bring economic, environmental and social benefits to cities. Moreover, technological and social innovation in urban agriculture can play an important role in mitigating climate change, closing nutrient cycles and build more resilient urban areas.

Scope:

The proposals should investigate innovative integrated urban farming systems which can use resources efficiently (e.g. space, energy, water, nutrients) and reuse or recycle heat, water, CO₂, waste or by-products from urban sources (e.g. industry, households) for agricultural production such as fruits, vegetables, herbs, sprouts, mushrooms, algae, ornamental trees and plants. Several resource-efficient production systems should be demonstrated in different open urban spaces (e.g. rooftop/vertical farming, individual/collective gardens, unused spaces) and in several cities. The innovative production systems and the associated value-chains should be built according to business models agreed with the relevant local actors and stakeholders. The contribution of these demonstrated production systems and value-chains to cities food security should be assessed as well as the economic, environmental and social impacts on the urban communities. Policy recommendations and best practices guides should be delivered, and knowledge platforms should be reinforced. Proposals should fall under the concept of multi-actor approach. In line with the EU strategy for international cooperation in research and innovation and in particular with the implementation of the EU-China dialogue, proposals are encouraged to include third country participants, especially those established in China.

Circular economy - [2016] Unlocking the potential of organic waste on urban environments.

Specific challenge: Waste production, processing and disposal are increasing challenges for urban areas. In this context, local biorefineries can use waste from surrounding industries and municipalities in a symbiotic manner. Today, there are very few examples of facilities that can convert the biodegradable fraction of municipal solid waste and sewage sludge into anything other than compost and energy. Further innovations in urban waste management schemes could contribute to better collection and processing of waste for the production of bio-based materials.

Scope: Catalogue proven and emerging innovations in the collection, processing and use of organic urban waste and sewage sludge, and on that basis identify potential new value chains. Create and support a platform of regional, municipal and local stakeholders. Identify technological and regulatory barriers that hinder the use of more biodegradable waste as raw material for bio-based products, and carry out targeted research that would help to address specific barriers.

Type of action: RIA

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