

Work Programme 2014-2015

Horizon 2020 Specific Programme for Societal Challenge 2: FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY

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Internal Working Document*

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Introduction

Activities under Societal Challenge "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy" aim at making the best of our biological resources in a sustainable way. The objective is to help secure sufficient supplies of safe and high quality food and other bio-based products, by developing productive and resource-efficient primary production systems and fostering related ecosystem services alongside competitive and low carbon supply chains. This will accelerate the transition to a sustainable European bioeconomy.

This Work Programme identifies a series of specific challenges to be tackled towards ensuring food Security, fostering sustainable agriculture and forestry, enhancing marine and maritime research and reinforcing the bioeconomy. To achieve this, the Work Programme offers opportunities in finding diverse and innovative solutions to well-identified challenges in key policy priorities for the EU. Through generic or dedicated topics, a broad participation of all interested parties is welcomed in these efforts. The overarching principle underlying the activities proposed is that applicants are invited to find solutions which will make positive changes for our society, economy and environment. In this respect, solutions should be found that cut across research and technological fields, with a strong innovation and market drive, helping to contribute to growth and job creation. The involvement of end users including farmers, consumers and society at large will be a key to achieve this.

In 2014 – 2015, the Work Programme of Societal Challenge 2 is composed of 3 calls. Emphasis is given to two focus areas: Sustainable Food Security (one Call) and Blue Growth, with a view to unlocking the potential of our oceans (one Call). Furthermore, a General Call on Societal Challenge 2 will address other main EU priorities relevant to food security, sustainable agriculture, marine and maritime research and the bioeconomy. Activities under this Societal Challenge also contribute to other focus areas, such as "Waste: a resource to recycle, reuse and recover raw materials" (calls published under another part of this Work Programme). Finally, activities with a strong innovation and industry drive will be implemented through the Article 187 Public-Private-Partnership on bio-based industries.

Contributions to tackling this Societal Challenge can be found also in other parts of the Work Programme, including the LEIT – Biotechnology, which could deliver technological breakthroughs in the biomass to bio-product value chain.

I. Focus Area Sustainable Food Security

Scene-setter:

Ensuring availability and access to sufficient safe and nutritious food is a key priority that impacts all EU citizens and needs to be ensured today and in the future. At the same time the production and processing of food is a key economic activity providing jobs, skills and training, attracting investments, supporting rural and urban economies and also shaping landscapes. Based on the economic scale of the food sector, the potential gains from research and innovation, and the structure of the sector with a strong participation of SMEs, this focus area will develop competitive and resource-efficient aquatic and terrestrial food production systems covering: eco-intensification of production; sustainable management of natural resources, including the accurate valuation of ecosystems services, while addressing climate change mitigation and adaptation; technologies for a sustainable food chain; safe foods and healthy diets for all; and a global food security system. Enabling technologies and space enabled applications will be an important element in achieving these goals. Research and innovation actions within this challenge will cover the whole food chain, including both the supply and demand sides.

The economic and strategic importance of the agri-food sector is reflected in the following figures: agricultural exports in 2011 were worth €105 billion, or 7% of the total value of EU exports; Europe's food and drink industry is the largest manufacturing industry in the EU and in 2010 generated an annual turnover of €56 billion, almost half of which by SMEs, with direct employment for over 4 million jobs. Actions in this area will support the EU Approach to Food Security; the EU Europe 2020 Resource-efficient Europe Flagship the European Innovation Partnership "Agricultural Productivity and Sustainability"; the Post 2015 Development Cooperation Agenda; the EU Biodiversity Strategy to 2020, and the reform of the common fisheries policy. It is expected that efforts in research will help achieve a 20% gain in resource use efficiency (Roadmap to a Resource Efficient Europe); help reverse the diminishing trend of productivity gains in primary production by 2020 (European Innovation Partnership); allow for the constant adjustment of food safety policy in view of new scientific evidence (European Consumer Agenda); and provide the integrated EU approach needed for reducing ill health due to poor nutrition, overweight and obesity.

To maximise the impacts of activities undertaken under this Focus Area, WP 2014-2015 focusses its efforts on key priorities for the EU to ensure that the critical mass needed to effectively tackle the different sub-challenges is attained with a focus on the main policy needs:

To progress towards sustainable food production systems, priority will be given in 2014 to minimising pre-harvest losses, improving soil management, and genetic resources supporting agricultural diversity and regional products, while 2015 will focus more on improved livestock and crop productivity and genetics for sustaining agriculture. To support the production of safe food and healthy diets, priority will be given to safe foods in 2014, and on sustainable and competitive food production in 2015. Finally, to integrate global drivers of food security, 2014 will aim at integrating a comprehensive view of

food security from small farming to global governance and 2015 will focus on furthering understanding of the current and future drivers of food security.

Due to its high cross-cutting nature, this call integrates contributions coming from different parts of Societal Challenge 2, and from Societal Challenge 1 on "Health, Demographic Change and Wellbeing" and is also relevant for Societal Challenge 6 on "Inclusive, Innovative and Secure Societies".

Sub-Focus SFS.1: Sustainable food production systems

Topic SFS.1.1: Supporting agricultural diversity and regional products

Specific challenge: Local livestock breeds and crops (landraces, conservation varieties) are a source of significant and so far underexploited genetic variation – commonly recognised as a pre-requisite to ensure adaptability vis-à-vis variable environments. They are characterised by a high degree of favorable characters such as robustness and adaptation to local – often marginal – conditions. In addition, these genetic resources provide the basis for products with a regional identity and highly specialised markets for which there is renewed consumer interest. Despite these benefits there has been a steady loss of utilised local varieties and indigenous breeds, partly resulting from lower productivity as compared to modern, high yielding, more uniform varieties. There is an urgent need to preserve and use the remaining diversity of local breeds and crops as well as to support their introduction into the value chain to sustain local and regional economies.

Scope: Projects will deploy a range of measures – spanning from research to networking, demonstration and dissemination - to promote the conservation and use of local varieties and traditional breeds along with their associated seed, farming and commercial systems. Activities will include an appropriate mix of actions to address issues of conservation, breeding approaches and productivity of local crops and breeds as well as tackle the supporting socio-economic, legal and organisational framework. Partnerships between different types of actors will allow bringing together a wealth of knowledge and resources from the formal and informal sectors and encouraging the creation of new networks (within and between regions) and interactions between various stakeholders (e.g conservationists, scientists, farmers, consumers and breeders).

Expected impact: Overall, project outputs will increase the capacity of rural areas to play an active role in the stewardship of genetic resources, strengthen specialised farming systems and breeding approaches and provide consumers with diverse, high quality products. Farmers and other SMEs will particularly benefit from the expansion or creation of new products and markets. By enhancing the use of adaptive traits from landraces results will also support broader adaptation of crops to changing agro-climatic conditions.

Additional info: Individual projects will address either plant or animal genetic resources. Actions proposed are considered to fall under the concept of "multi-actor approaches" (see glossary).

Funding scheme: CP – R&D Project

Year: 2014

Topic SFS 1.2: Genetic resources to sustain current and future agriculture and forestry

Specific challenge: Modern agriculture has developed in the last decades on the basis of a narrowed pool of genetic resources, leading to increased genetic vulnerability and genetic erosion. Challenges faced by agriculture – including climatic variability, increased pressure from pests and diseases, resource scarcity and related move towards lower-input production– call for an expansion of the genetic resource base in plant and animal production.

Improved access to genetic resources is a major priority for scientists, breeders and farmers alike and requires creative management of ex-situ and in-situ collections.

Scope: The project will provide a comprehensive framework (in a programme like approach) for the promotion of genetic resources and coordination of a range of activities along the whole "genetic resources value chain". It shall serve as a central point of reference for strategic matters concerning e.g. the standardisation, management and access to information on genetic resources or compliance with international commitments. Specific actions resulting from competitive calls within the project (in line with relevant Horizon 2020 provisions) will support collection, conservation and regeneration of genetic resources as well as improve their characterisation and use in breeding activities. Activities targeting in-situ conservation will take particular account of participatory breeding approaches. Stakeholder engagement and public-private partnerships will be encouraged leading to the creation of effective networks between the conservation, evaluation, breeding and farming sectors and also take into account demonstration and outreach to the wider public. International collaboration is encouraged as appropriate.

Expected impact: Outputs of the project and subsequent actions will help reducing the current bottlenecks at the interface between conservation and use of plant and animal genetic resources in breeding and farming activities. The identification of useful variation will accelerate the genetic improvement of crops, forest trees and breeds, thereby not just leading to innovations in breeding and farming but also contributing to food security and sustainability of forests. Activities will increase awareness on the value of genetic resources and also serve to implement international commitments in the area (notably the ITPGRFA, CBD and Nagoya), thereby further developing the international governance of biodiversity.

Additional info: Actions proposed are considered to fall under the concept of "multi-actor approaches" (see glossary).

Instrument: CP – R&D Project (with cascading call)

Year: 2015

Topic SFS 1.3: Understanding and managing soil quality for better yields

Specific challenge: Soil quality and function – resulting from its physical, chemical and biological properties – provide the basis for crop production and in turn is impacted by the different types of on-farm land use, management practices, choice of cultivars and genotypes. Effects include not only changes to the organic carbon content, nutrient cycling and water storage ability but also to the composition of the soil organism community and to wider plant-fungal-microbial interactions. Understanding this complex and fragile interplay is crucial to detect soil constraints as well as to derive soil

management and conservation recommendations to increase agricultural productivity in climate and environmentally friendly ways.

Scope: Proposed activities will further elucidate the effects of land use on farm soils (including soil carbon), further refine indicators of soil health and function and propose ways by which the "soil footprint" of different cropping systems and management interventions can be established. In doing so, work shall take into account various types of farming systems and geo-climatic zones across Europe. Based on this wide assessment activities will provide a testing ground for practical solutions at farm scale that enhance key soil attributes for higher yields and yield stability.

Impact: Project outputs will generate reliable tools/methods/strategies to monitor the "health status" of agricultural soils with regard to their vital functions. In addition, they will increase capacity to assess soil-agronomy interactions and their impact on soil functions and thereby help to improve soil husbandry practices and overall farm management. This will result in a more effective use of the beneficial effects of multifunctional soils for crop productivity and yield stability.

Additional information: Selected project(s) will closely collaborate with the one(s) selected under the topic on conservation agriculture.

Instrument: CP – R&D Project

Year: 2014

Topic SFS.1.4: Addressing the productivity gap in crops

Specific challenge: Crop productivity is determined by the complex interactions of the genotype (G) with its environment (E) and management practices (M). Capturing the dynamic of these interactions in breeding programmes and farm management is considered as critical to further progress in crop improvement.

Scope: Proposed activities will apply GxExM approaches to optimise breeding activities and crop management at each stage of plant development capitalising on latest advances in genomics, modelling and agro-ecology.

Expected Impact: Outputs will significantly enhance the capacity of the European breeding sector to develop improved varieties as regards a number of relevant traits. In addition, results will inform crop management strategies tailored to the specific needs of genotypes in different target environments. By taking advantage of individual gains – i.e. at the level of combination of suitable genotypes and management practices it is expected that agriculture will increase its ability to implement step changes in productivity.

Additional information: Actions proposed are considered to fall under the concept of "multi-actor approach" (see glossary)

Instrument: CP – R&D Project

Year: 2015

Topic SFS.1.5: Increasing efficiency of terrestrial livestock production through genetics and nutrition and alternative feed sources

Specific Challenge: Due to the increasing global demand for animal derived food under a mounting pressure over land use, the efficiency of livestock in producing food still needs to be optimised, while decreasing the environmental footprint and increasing quality, e.g. nutritional value. Precision feeding could increase the feed efficiency by adapting accurately the needs and the delivery of feed to individual animals. New

phenotypes linked to sustainable animal productivity could be developed and integrated into breeding schemes. The development of new or alternative feeds, in particular as protein sources, has the potential to minimise reliance on imports and increase European self-sustainability. This call also involves socio-economic aspects as new business models and management systems are needed for specific production systems.

Scope: Precision feeding including new feeding management systems will fine-tune the exact need of individual animals, taking into account their physiological, health and welfare status, as well as their genetic make-up. This will require the use of new traits linked to feed conversion efficiency and to sustainability, such as reduced waste emission or robustness. Easy and cheap to record phenotypes will be used for modelling biological functions of livestock and develop predictive approaches of performances, for use in breeding and for practical feeding and production systems. Diversifying feed sources will cover the use of by-products of the food industry, organic waste streams and alternative crops together with a better use of local resources (e.g. pastures). Risk assessments and life cycle assessments have to be calculated for the assessment of the potential of the new technologies, as well as their influence of food quality. Activities should address the diversity of production types, both of livestock and geographical conditions. The centre of gravity should be R&D activities, also showing the technical feasibility of the approach in a simulated environment. Demonstration activities of the most promising solutions should be organised. Involvement of livestock industry is expected.

Additional information: Actions proposed are considered to fall under the concept of "multi-actor approach" (see glossary).

Expected impact: Increased resource productivity in livestock will moderate the pressure on the environment from the animal food chain. New traits correlated with efficacy, reduced footprint and robustness will be incorporated into breeding schemes of various farm species to select animals more adapted to environmental changes. Key enabling technological developments will make Europe frontrunner in re use of by products and protein rich resources for feed.

Instrument: CP – CTM project (*or R&D, tbc*)

Year: 2015

Topic SFS.1.6: Optimising external nutrient inputs in intensive crop production systems in Europe

Specific Challenge: European crop production is facing more and more difficulties in remaining competitive in the global market for many reasons. One of these reasons is certainly the high cost of external nutrient inputs necessary to keep the needed standards of productivity, both in qualitative and quantitative terms. Moreover, for what concerns the provision of two of the main nutrient elements, Nitrogen and Phosphorous, European agriculture is almost totally dependent on imported products, especially for Phosphorous, or on fertilizers produced with expensive industrial processes, which generates GHGs with consequent negative impacts on the environment and on Climate change.

European intensive crop production systems are highly dependent on the massive use of external nutrient inputs, mainly fertilisers of mineral and synthetic origin, which in the current farming practices, are not generally used in an optimal way. Misuse and overuse of these external inputs represent an economic loss for the farmer and a significant burden for the environment, as they are among the main responsible for ground water and

surface water pollution, GHGs emissions and for the concentration of compounds in soil, such as heavy metals and organic contaminants, with these negative effects being particularly relevant in intensely cropped areas.

Scope: Recent technological progresses could allow finding innovative and effective strategies to improve external nutrient inputs management and optimise their use efficiency at farm level. These novel approaches could include integration of precision farming latest tools and techniques, such as advanced automation, variable rate applications, remote sensing, field and crop sensors, ICT technologies, to achieve a comprehensive system for nutrient inputs management on European intensive crops providing significant progress beyond the current state of the art. Modernisation of crop production systems and in particular limitation of external inputs, is of paramount importance for the competitiveness of the entire intensive crop production sector in Europe, and the development of novel technologies in this domain could allow reaching improved sustainability by decreasing negative impacts on the environment and providing better product quality and benefits on human health.

The proposed technologies should be suitable for different intensive crop production systems. In-field demonstration of the technologies on a relevant scale to prove concept feasibility should also be foreseen.

Additional information: Actions proposed are considered to fall under the concept of "multi-actor approach" (see glossary).

Expected Impact: The project funded under this topic should develop technologies that provide a significant reduction of external nutrient inputs in intensive cropping systems - while keeping high levels of productivity - providing further benefits, with particular emphasis on 1) the improvement of European farmers' competitiveness through savings; 2) the improvement of ground and surface water quality; 3) the reduction of soil contaminations, with clear benefits on the conservation of biodiversity, on wildlife and on human health, through the reduced release of pollutants and greenhouse gasses.

Instrument: CP – R&D Project

Year: 2015

Topic SFS.1.7: Tackling losses from animal diseases

Specific challenge: Livestock diseases reduce the efficiency of animal production with an estimated 20% losses and they have a major impact in terms of economic costs and animal welfare. The global demand for animal protein is expected to increase sharply in the future with a further intensification of animal production, mostly for swine and poultry. These intensive conditions favour the rapid circulation of pathogens and the emergence of new or more virulent strains. Vaccination can be an efficient way to fight the transmission of pathogens and to reduce the use of antimicrobial drugs. Although vaccines exist for most livestock diseases, vaccines may induce incomplete immune responses or too short protection and deeper knowledge is required to develop safer, cheaper and more efficient vaccines on diseases with major impact on production costs.

Scope: Research activities will cover specific diseases of poultry and swine, as these are the most intensive production systems, with the fastest market growth.

The goal is to better understand the interaction between the immune system of swine and poultry species and their specific pathogens, in particular pathogens associated with high

production losses and to develop innovative and multivalent vaccines. The project will aim at:

- Understanding the genetic variation in vaccine responsiveness and immune-competence at different developmental stages and disease outcomes
- Using knowledge within the different components of the host immune response for an earlier onset of protection and a longer duration of immunity.
- Developing novel vaccine vectors including DNA and DIVA vaccines together with novel and easy-to-use delivery systems and efficient adjuvants.
- Deciphering the basis of resistance to diseases and defining biomarkers and phenotypes to inform breeding strategies for subclinical diseases and increased disease resistance.

Demonstration activities of the most promising solutions should be organised. At least one vaccine at the demonstration level should be developed for both poultry and swine. Involvement of the animal pharmaceutical industry is expected. Significant SME involvement should be ensured.

Expected impact: New, cheaper and more effective vaccines in swine and poultry diseases will increase the production efficiency and profitability of these industries and the level of animal welfare should rise concomitantly. Better control of diseases and a reduced use of antibiotics help minimising potential public health risks in a "One Health" perspective.

Instrument: CP – CTM or R&D project (*tbc*)

Year: 2014

Topic SFS.1.8: Practical solutions for pests, weeds and invasive species in agriculture and forestry

Specific challenge: Pests, weeds and invasive species cause yearly losses to agriculture and forestry and increase production costs. Invasive species can also act as vectors of new pests and diseases, impact negatively on native species (e.g. outcompete) and therefore change biodiversity patterns and disrupt landscapes. In addition, the number of invasive alien species in Europe is increasing as result of globalisation of trade and increased mobility of persons and goods. Furthermore, climate change is expected to favour the permanent establishment of many alien pests throughout Europe. As regards pests and diseases, more environmental friendly approaches in pest and disease management are sought, in line with the Directive 2009/128/EC laying down the need of application of Integrated Pest Management (IPM) practices from farmers by 2014. Nevertheless, the number of available Plant Protection Products is decreasing. Efforts so far have been focused on mapping the pests and invasive species, as well as on detection, diagnosis, and outbreak scenario analysis. However, there is now a need to go beyond these data and further develop integrated mechanisms of response measures (practical solutions) for preventing and combating the 'phenomenon' overall and reduce its impacts. Novel IPM solutions are also needed to support sustainable agricultural production.

Scope: Projects should address threats for both the agricultural and forestry sectors. Research should address a number of pests and diseases, weeds and invasive species (including quarantine organisms) that are a real threat for Europe and are causing significant economic losses and have a large environmental impact. It should focus on issues where barriers are already identified and will build on existing knowledge,

complementing the on-going projects. Projects should provide advanced solutions for pest and weed management utilising the latest technologies such as robotics, ICT, sensors, remote sensing, and image processing, with integrated approaches. While the centre of gravity should be R&D activities, the technical and economic feasibility as well as the industrial relevance of the proposed technologies and mechanisms should be proven through relevant demonstration activities. International cooperation with third countries experiencing the same problems is encouraged. Involvement of industry to translate the finding into marketable products is required. SMEs involvement in the projects is also expected.

Additional information: Actions proposed are considered to fall under the concept of "multi-actor approach" (see glossary).

Expected impact: Results should provide prevention mechanisms and effective solutions for the "management" of pests, weeds and invasive species and support the relevant EU policies. These solutions should be sustainable and environmentally friendly, provide significant economic gains for the European agriculture and provide increased product quality (e.g. lower level of chemicals). In the case where the invasive species is established in Europe, solutions for its containment should be sought. Development of integrated management systems that are inclusive for several land uses and types of "threats" is also expected. Active dissemination towards end-users of sustainable procedures, methodologies and products is required. Novel products will be made readily available to the market.

Instrument: CP – R&D Project

Year: 2014

Topic SFS.1.9: Conservation Agriculture strategies for Europe

Specific challenge: In mainstream crop production systems, soil labour and tillage operations are considered basic requirements, but they also represent a high cost for the farmers, in terms of machinery investment, maintenance, fossil fuel consumption and labour. In addition, there are increasing evidences of the negative effects of these heavy operations on soil, such as increased soil erosion, soil compaction, decreased soil biodiversity and functions and production of GHGs. Despite the almost general accepted assumption that minimal soil disturbance (no-till or minimum-till) brings many beneficial effects, such as improving soil health, soil biodiversity, fertility and water retention, reducing GHGs emissions, and less chemicals leaching to water, the adoption of Conservation Agriculture (CA) techniques by European farmers, which would also facilitate the implementation of the LULUCF Decision¹, is still lagging behind.

Scope: Research and demonstration efforts are necessary to assess the potential and real benefits that CA techniques can bring to European agriculture, in terms of more rationale

¹ Land Use, Land Use Change and Forestry (LULUCF), is used in relation to the forestry and agricultural sector in the international climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). LULUCF covers greenhouse gas (GHG) emissions into and removal of carbon from the atmosphere resulting from soils, trees, plants, biomass and timber. In March 2012 the European Commission made a proposal to harmonise accounting rules for these emissions and removals across the EU. The Council and the European Parliament reached agreement on a text in December 2012, and this was formally approved by the Parliament in March 2013. Once adopted by the Council, the decision is expected to enter into force in the course of 2013.

use of natural resources, reduced energy needs, decreased GHG emissions, soil fertility conservation, above and below ground biodiversity conservation and increased productivity. Scientifically supported and field tested evidences of the mentioned beneficial effects of minimally disturbed soils strategies are needed to promote the adoption of CA techniques by European farmers. Considering the different European pedo-climatic conditions and the varieties of cropping systems, the development of tailor-made CA strategies, techniques and machinery suitable to different farming areas and adapted to different crops and crop systems, will help to overcome the current barriers that prevent the adoption of CA in Europe.

Additional information: Actions proposed are considered to fall under the concept of "multi-actor approach" (see glossary).

Expected Impact: Widespread adoption of CA techniques by European farmers will have a double beneficial impact; firstly, it will increase competitiveness through the reduction of production costs; secondly, it will reduce the negative environmental impact of crop production through less soil disturbance, better exploitation of soil biodiversity and functions and more rational use of the natural resource base.

Instrument: CP – R&D Project

Year: 2014

Topic SFS.1.10: Towards more resource-efficient food processing methods

Specific challenge: The increase in the world population, changing consumer demands and ever-increasing pressures on the earth's natural resources and the climate require the development of more resource-efficient and therefore sustainable food processing methods along the whole food chain. Most of the currently used food processing methods have considerable, but not sufficiently exploited, potential for meeting the goals of sustainably increased resource efficiency as well as to bring innovation to SMEs. Therefore, there is a need to review current food production systems in SMEs with the aim of optimising current processes, or of developing new or alternative processes in order to maximise resource efficiency, whilst reducing food waste and improving, or at least maintaining, food safety and quality.

Scope: The proposals should provide means for significantly saving resources along the entire length of the post-harvest chain at all scales of business – from supplying raw ingredients to processing (operations and cleaning), packaging, warehousing, distributing, retailing and household handling – in a competitive and innovative way, while reducing food waste and improving or at least maintaining shelf life, food quality and safety. A sufficiently representative sector of the food industry has to be targeted (except the dairy sector), and the selection has to be well justified in terms of technological and policy relevance, also involving an environmental, social and economic life-cycle assessment in line with the ILCD² handbook. The use of ICT solutions based on modern principles of data collection and reuse is expected. Dissemination of research results to equipment producers and the food industry and demonstration activities in the food industry are required to fill the gap between R&D and practical implementation.

Expected impact: The development of innovative and sustainable food processing methods will increase the competitiveness of the European food and drink industry, in particular SMEs, while minimising their ecological footprint. The research leads towards

² International Reference Life Cycle Data System; <http://lct.jrc.ec.europa.eu/pdf-directory/>

a resource-efficient economy via a notable reduction in water and energy use, less waste and an increased efficiency in the use of raw materials, which contributes to achieving the resource efficiency objectives for 2020 and beyond as planned in the "Roadmap to a resource-efficient Europe".

Instrument: SME-instrument

Year: 2015

Topic SFS.1.11: First Market replication of innovative solutions for sustainable novel food processing technologies

Specific challenge: Throughout the last decades, much research on innovative food processing technologies has been carried out, such as high hydrostatic pressure (HHP), ultrasound, pulse electric field (PEF), and advanced heating by microwave, ohmic heating, and radio frequency waves. However, market failures and barriers have hindered promising results of research and innovation in novel food processing from finding applications in the market. One of the means to support sustainable food security is first market replication of innovative solutions in sustainable novel food processing technologies.

Scope: Actions should support the first application and deployment in the market of an innovation that has already been demonstrated but not yet applied or deployed in the market due to market failures or barriers to uptake in the field of novel food processing technologies. Main activities correspond to a Technological Readiness Level (TRL) 7/8 if the project includes final technical validation at system level in real life operational conditions, and to TRL 9 if the project does not involve technical risks and deals only with the confirmation of the functional and economic added value for the users.

“Market replication” does not cover multiple applications in the market of an innovation that has already been applied successfully once in the market. “First” means new at least to Europe (i.e. the innovation may have been deployed in another region of the world having a more favourable market context) or new at least to the application sector in question (i.e. it may already have been applied in Europe in another sector). Actions consist of one or several of the following close-to-market activities: validating benefits for the users or buyers of the first application or deployment of an innovation in real life operating conditions; confirming technical and economic performance at system level in real life operating conditions; validating standards, e.g. for improved interoperability; activities to ensure optimal access to and dissemination of the project results across Europe so as to avoid market distortions on the producer side and achieve maximum uptake on the user side; activities on other aspects affecting market deployment and uptake such as: standardisation and regulatory issues, market assessment and business plan, and non-technical aspects of innovation (e.g. social, organisational, business model, marketing method). Users and/or buyers should be actively involved.

Expected impact: The gap between R&I and applications on the market of innovative solutions will be bridged via a wide and fast deployment of the innovation resulting from greater user acceptance, visibility of the innovation and creation of scalable markets. This will result in improved competitiveness as well as growth and diversification opportunities for the EU food (equipment) sector in general and SMEs in particular.

Instrument: CP – CTM (First Market Replication Project)

Year: 2015

Sub-Focus SFS.2: Safe food and healthy diets

Topic SFS.2.1: Coping with the challenge of biological contamination of crops

Specific challenge: The occurrence of biological contamination in various crops, in particular cereals but also in other foods e.g. nuts, chestnuts or dried fruits, represents a challenge for potential use in feed and food. Worldwide, it is estimated that mycotoxins are responsible for losses of up to 5-10% of crop production. The issue affects feed and food safety, food security and international trade. Contaminations are due to a series of events: wet weather conditions and possible effects by climate change, land use and crop rotation, varieties and cropping practices, harvest and post-harvest (drying and storage). Contamination can be controlled by physical sorting and cleaning, but dilution activities on batches exceeding the legal thresholds are not authorized in the EU. Moreover safe decontamination methods validated by the European Food Safety Agency are not available. A considerable amount of research has been funded worldwide and in the EU in this area. However, no single approach has proven successful. Integrated approaches to control contamination from crop production to feed and food chains are therefore crucial. Indeed, given the production limitations of agricultural land, a regulatory approach based on more sophisticated methods to assess the intake and setting increased legal contamination thresholds is not a long-term solution for contaminants which have genotoxic and carcinogenic profiles and for which specific control methodologies and strategies shall be identified in the medium to long term.

Scope: Research activities will cover all stages from production (breeding, good management practices), harvest to post-harvest and will aim at bringing solutions that are effective at the various stages of the feed and food supply chains, including safe uses of contaminated batches. Conventional and organic supply chains will be both covered. Covered crops will include - but not be limited to - cereals. Research will also investigate the availability and development of reliable and cost effective control tools to policy-proposed solutions. The use of ICT solutions based on modern principles of data collection and reuse will be expected. Research activities should have a multi-actor approach.

Expected impact: The research will provide integrated solutions minimising the contamination by mycotoxins for several major crops in the EU and provide management solutions for safe use. Reduced occurrence of contamination by mycotoxins of major crops will improve the competitiveness of the farming sector and reduce risks for human and animal health. A range of safe use options for contaminated batches will increase resilience of the food supply chain complementing actions at crop production level.

Instrument: CP – R&D Project

Year: 2015

Topic SFS.2.2: Novel sustainable sources of proteins

Specific challenge: As a result of the growing world population and income and changes in lifestyle and food preferences, there is an increasing demand for food, particularly for meat and other protein-rich sources. In order to attain sustainability and food security, more efficient food production processes need to be explored. Proteins are an important part of our diet. However, the present conversion paths from plant proteins into animal

proteins for human consumption are rather inefficient, and therefore other sources of high-quality proteins from living organisms need to be explored.

Scope: A holistic integrated approach is needed that encompasses all aspects of the production and processing chain. Other aspects to be addressed are quality and safety, including the development of quality, safety and regulatory criteria at a European level along with the sustainability assessment of the proposed new food sources. Finally, consumer acceptance needs to be considered, and particular emphasis needs to be placed on dissemination, communication and exploitation activities. The activities will clearly demonstrate how the new proposed protein sources can provide innovative, cost-effective and resource-efficient alternatives to traditional ones with less negative impacts on the environment, human health and biodiversity. In the end, innovative food products that are based on the new high-quality protein will be introduced into the market. The involvement of participants from INCO countries is particularly welcome for this topic.

Expected impact: The added value at European and international level lies in increasing the innovation capacity of raw material production and the food industry and in fostering progress toward sustainable food security. The expected results will enable the sustainable production of novel high-quality protein and nutrient sources and their viable uptake in the market. The results of research into this topic should be of direct interest and potential benefit to SMEs. The research will support EU policies on agriculture, nutrition, health, environment, development and sustainable food security.

Instrument: SME-instrument

Year: 2014

Topic SFS.2.3: Improving the control of infectious epidemics and foodborne outbreaks through rapid identification of pathogens (topic with other services - RTD.F)

Specific challenge: The health of animal and human populations worldwide is confronted with the threat of existing, new or emerging infectious diseases and epidemics spreading faster and appearing more frequently than ever before. Meanwhile, modern demographic, environmental, technological and societal conditions favour the spread of these diseases, at a global scale. Besides being a major threat to human populations, infectious diseases in to both animals and humans can turn into a severe burden on health and veterinary systems. As for the food sector, foodborne outbreaks can unsettle consumers' trust and have negative effects on trade and the economy of the sector. They also pose a threat to the sustainability of the food chain and undermine food security. Many of these infections are zoonoses, thus necessitating an integrative approach to research and public health measures in the human and veterinary field including the food chain ("One Health" approach). This raises new challenges beyond national borders to, public health, veterinary and food safety scientists and experts, policymakers, and populations.

Scope: Sequenced-based methods on identification and characterisation of pathogens should be applied. An information system for all sectors (public health, food, animal) should be developed, that stores and analyses sequence-based data and combine them with clinical, microbiological, epidemiological and other data required for risk assessment (RA). It should improve pathogen monitoring, including rapid identification and comparison, and geographical mapping. It should include predictive models on RA,

to identify 'high-risk' areas and disease-emergence patterns, by analysis of the drivers of spread, their synergism and impact. It should ensure links and consistency with existing networks and databases (TESSY, RASFF, EWRS, EFSA/ECDC, molecular testing database) and compliance with data protection requirements. Harmonised standards for sampling, sequencing, (meta-) data collection, management and sharing and better management tools for authorities, businesses and citizens should be developed. Researchers need to collaborate in an interdisciplinary approach on a European and global scale in order to develop tools and methodologies for risk assessment, risk management and risk communication between authorities.

Expected impact: Global standards for faster identification of pathogens and better and more integrated surveillance tools for infectious diseases will be developed. They will contribute to the containment and mitigation of epidemics and to the recently established "Global Research Collaboration for Infectious Disease Preparedness". The preparedness of animal and human health services (including the European Agencies EFSA and ECDC) to new and emerging epidemics will be improved and standardised processes at European and International level will be available. An efficient use of resources and mitigation of the potential economic impact of new and emerging epidemics and a reduction of health care costs will be achieved. They will also help minimize market losses and facilitate international trade, thus increasing the competitiveness of the European food and agricultural sector. Overall, the sustainability of the food chain will be reinforced and food security will be enhanced.

Instrument: CP – R&D Project

Year: 2014

Sub-Focus SFS.3: Global drivers of food security

Topic SFS.3.1: Small farms but global markets: the role of small and family farms in food security

Specific challenge: The contribution of small and in particular family farms to EU and global food security has been gaining attention, particularly in the context of less developed countries. While small farms, as well as other small and micro-sized food businesses have an important role to play in maintaining a stable source of income (and food) in poor rural areas, the persistence of this "social" agriculture is often placed in contrast with a "commercial" model of agriculture to feed future populations. This comparison, arguing for the benefits of commercial agriculture through economies of scale tends to neglect the environmental and social aspects of sustainable farming systems. It is therefore important to gain a better understanding of the potential contribution of small farms and food businesses to current and future food security and their resilience to shocks in an increasingly globalised and uncertain world. In particular, it must be understood how small and family farms contribute to a "right balance" between economic-environmental-social sustainability, taking into account the linkages with the downstream sector and in particular small and medium sized enterprises and retailers as well as differentiating between urban and rural dimensions of food and nutrition security. It is equally important to identify the requirements to achieve this balance, particularly with regard to infrastructure (incl. transport, energy, communication, food-safety, etc.), supply chain (local/regional markets) and governance (local/global).

Scope: Proposals should thoroughly assess the role of small and family farms in achieving sustainable food and nutrition security. Research should evaluate the benefits or disadvantages of small and family farms in contrast with alternative farming practices ("commercial" in particular), including the implications on small and medium size businesses along the supply chain and within the context of demographic developments. Research should identify the optimal enabling environment for small and family farms to accomplish the aforementioned role with respect to infrastructure, supply chain and governance needs. Foresight activities will be carried out to project potential weight and role of small and family farms in a few decades' time. Research work should build upon existing knowledge and take into account activities in the run up to the 2014 International Year of Family Farming and Smallholder Farming and follow up activities/initiatives after 2014. Geographic coverage should include EU, Africa and Asia.

Expected impact: A better understanding of the role of small and family farms and small food businesses in meeting the sustainable food security challenge (across its various dimensions and taking into account the different aspects of sustainability) as well as the general economic and policy environment enabling small and family farms to improve their performance. Better tailoring of international cooperation to the farming sector and targeting of agricultural research for development.

Instrument: CP - R&D Project

Year: 2014

Topic SFS.3.2: Towards global sustainable food governance

Specific challenge: Global food security has been identified as one of the greatest challenges faced by human society and is very much linked to economic wealth. In this respect, globalisation has created opportunities for economic development as well as risks (if not well managed). On the one hand, globalisation reduces inequalities between regions, and it can provide increased chances for trade in agro-food products with the potential of attenuating food crisis impacts, of joining higher value added markets, and of easier access to investment and existing technologies and practices. On the other hand, globalisation may lead to greater inequalities within regions causing concerns for increased prospects of social instability. And it can lead to higher risks of over-exploitation and degradation of natural and basic resources, food safety threats, income disparities among the different actors of the food chain, recurrent price shocks with differential price transmissions, and even food insecurity. It depends on the underlying economic policy and socio-political environment whether globalisation becomes a success or a failure for particular countries and/or particular segments of their population.

Scope: Research should develop and test an analytical framework encompassing the impacts of the various factors of globalisation on food security as well as on people's right to food sovereignty. The aim for the European research community in partnership building with non-Europeans is to identify the main economic and policy drivers determining the positive outcome of globalisation regarding the entire agro-food supply chain, with particular focus on long-term economic, environmental and social sustainability, including the various dimensions of food security. Research should then determine the enabling economic and policy environment allowing for a maximisation of benefits from globalisation. Aspects to consider are type of knowledge, innovation, investments, people's right to food sovereignty, the impact of trade, and especially

standards, and of climate change, on poverty, food wastage and domestic productivity. In view of the urbanisation trend, strategies will be developed to meet the increasingly refined demand of the urban consumer via small and medium-sized food companies. Actions will be identified to address current and potential deficiencies of administrative, technical and scientific capacities in developing countries to comply with food safety standards, whether public or private.

Expected impact: The European added value of this topic lies in its potential for an integrated approach encompassing, in well-formulated conceptual framework, the total food system from consumers to ecosystems while addressing all involved, either individually and/or in their interactions. This approach has the capacity to identify broad policy responses to improve the state of global food and nutrition security by identifying the relevant economic and policy environment for various stakeholders along the supply chain and for different agro-food systems to reap the benefits of globalisation or at least minimise its negative implications. This topic will contribute to the EU commitment regarding the Millennium Development Goals.

Instrument: CP – R&D Project

Year: 2014

Topic SFS.3.3: Socio-economic challenges, price shocks, food choice and hidden hunger

Specific challenge: Over recent years, European farmers, manufacturers, retailers and consumers have been confronted with different food-related socio-economic shocks and challenges. Prices of food and agricultural commodities have been subject to inflation and major oscillations, triggered by climate change and extreme weather patterns, fluctuations in energy prices, inappropriate policy responses, demographic change, rising global demand, and implications of the financial and economic crisis. In the last decades, organic, local and non-processed food chains have emerged as an alternative to the traditional industry-retailer food chain, driven by environmental, economic and territorial considerations. The extent to which such an increasingly diverse food system can contribute to overall sustainability, as well as the effect of the interaction and co-existence of alternative supply chains on the behaviour of stakeholders, are not well understood. All these factors have significant impacts on food systems, diet quality and food consumption patterns, especially for vulnerable groups (hidden hunger). Many questions thus remain on how the dynamics of the various food systems and the drivers of their development (including policies and other factors that influence behaviour and social norms), agricultural commodity (and food) price instability, and the global socio-economic context influence food choices.

Scope: The actions should address the behaviour of the different stakeholders in the food chain. Specific emphasis should be put on consumption patterns and their main socio-economic drivers (social status, income, etc.). Scenarios for future European food production and supply chains need to be put forward, taking into account the diversity of food systems and food consumption patterns in Europe. Sufficient attention needs to be given to sustainable and healthy diets for all, hidden hunger, the gender dimension, and the quantification of consumer behaviour through and socio-economic models and reliable data collected and analysed using modern ICT principles. The activities should cover the main existing and emerging food systems in a representative number of

countries. The results should be made accessible in appropriate formats to policymakers and to the EU food sector, and should include market regulation options aimed at improving the functioning of and innovation in agri-food markets.

Expected impact: The main impact is on food consumption: a better understanding of the drivers of food consumption patterns and its implications on the diversity of food systems, an increased capacity to model and predict food consumption trends in the EU, and better policies to foster sustainable food consumption and healthy diets, in particular towards vulnerable groups. Another impact will be on policy initiatives related to the Common Agricultural Policy, specifically the EC communication “The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future”. The knowledge generated improves the potential for service and social innovation and of business models for SMEs. This will contribute to growth and diversification opportunities for the agri-food supply chains, and thus improved competitiveness and economic, environmental and territorial sustainability of the EU agri-food sector.

Instrument: CP – R&D Project

Year: 2015

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II. Focus Area Blue Growth

Scene-setter:

Rapid technological progress in working offshore in ever-deeper waters, the need to reduce greenhouse gas emissions, and the need to look at how the 71 % of the planet that is ocean can deliver human necessities such as food and energy in a sustainable way have opened up an opportunity for blue growth with the aim to harness the untapped potential of Europe's oceans, seas and coasts for jobs and growth. This focus area addresses this overall challenge through five cross-cutting priority domains supporting the Blue Growth Agenda: valorising the diversity of marine life; sustainable harvesting the deep-sea resources; new offshore challenge; ocean observation technologies; and the socioeconomic dimension. The aim of the focus area is to improve the understanding of the complex interrelations between various maritime activities, technologies, including space enabled applications, and the marine environment to help boost the marine and maritime economy by accelerating its potential through R&I. It will enhance sectoral and cross-sectoral cooperation by building on major international, regional and national initiatives.

At present ocean's bio-resources provide 15% of the animal protein consumed globally; blue biotechnology has an expected yearly growth rate of 5 to 10%; deep-sea minerals extraction could gradually represent up to 10% of the world's minerals; marine renewable energy rapidly extends to 40 GW of offshore wind capacity by 2020 and an exponentially rising 3.6 GW of ocean energy by 2030. The Blue Growth economy in the EU is expected to grow to 7 million people employed by 2020. Actions in this area will support the EU Blue Growth Strategy and relevant EU policies as well as provide in particular for transatlantic cooperation.

To maximise the impacts of activities undertaken under this Focus Area, WP 2014-2015 focusses its effort on key priorities for the EU, so as to ensure critical mass to tackle sub-challenges with scale and scope on the main policy needs:

The valorisation of the diversity of marine life will put emphasis on the sustainable exploitation of Atlantic marine ecosystems in 2014, while 2015 will focus of valuing and mining marine biodiversity. The new offshore challenges will be tackled in 2014 through a study preparing potential further large scale initiatives and two initiatives focused respectively on sub-sea technologies and sustainable dredging while in 2015 a large scale initiative on oil spill and maritime pollution is foreseen. A preparatory action for potential further large scale initiatives on seabed mining will also be supported in 2014. A large-scale initiative on improving ocean observation technologies will be supported in 2014. Finally, engaging with society will be promoted through actions aiming at improving Ocean Literacy in 2014 and 2015.

Activities under this Focus Area will contribute significantly to the Transatlantic Research Alliance to reinforce cooperation between the EU and Canada and the US (and Brazil) on the Atlantic.

Due to its high cross-cutting nature, this call integrates contributions coming from different parts of Societal Challenge 2, and from Societal Challenge 1 on "Health, Demographic Change and Wellbeing": 3 on "Secure, Clean and Efficient Energy", 4 on

"Smart, Green and Integrated Transport" 5 on "Climate Action, Resource Efficiency and Raw Materials"; and is also relevant for Societal Challenge 6 on "Inclusive, Innovative and Secure Societies".

Sub-Focus BG.1: Sustainably exploiting the diversity of marine life

Topic BG.1.1: Improving the preservation and sustainable exploitation of Atlantic marine ecosystems

(topic from other services - RTD.I)

Specific-Challenge: The North Atlantic is a key marine region, contributing in regulating climate while encompassing ecologically and biologically important and fragile ecosystems (e.g. deep cold-water corals). Since the Middle Age, the exploitation of aquatic living resources in the North Atlantic has been a key driver for growth and wealth creation in several coastal areas. However, the biodiversity and functioning of this fragile environment as well as the products and services they provide are currently under enormous threat. The pressures acting upon them require the development of adaptive management plans sensitive to these pressures and the development of environmentally friendly technologies to ensure sustainable exploitation with a minimum impact in the wider marine ecosystem.

Scope: In view of the importance of the physical, chemical, biological and socio-economic features of the Atlantic for global climate and its provision of goods and ecological services there is a need to improve our capacity to model, understand and predict shifts in the dynamics of Atlantic ecosystems. Knowledge gaps should be filled in to deepen our understanding of the biogeographic patterns, biodiversity and ecosystem services and goods (including seafood) supported by different marine ecosystems at ocean basin and regional scale, with a view to better preserve them and unlock their potential for the sustainable production of new products and industrial applications. Furthermore, the development of new adaptive (ecosystem based) management approaches is necessary to enable the sustainable exploitation of the living resources and the good governance of the Atlantic marine ecosystem by the bordering countries. These management approaches should consider socio-economic changes and their interactions with the marine environment in order to allow its commercial exploitation while ensuring its preservation.

Expected impact: Implementation of international agreements to conserve Vulnerable Marine Ecosystems³ and Ecologically or Biologically Sensitive Areas⁴. Creation of sustainable growth and jobs through innovative marine technology. Application of the ecosystem approach to resource management and governance. Improved cooperation among EU Member States with respect to Atlantic ecosystem based research as well as with Third Country (e.g. US and Canada) researchers. Better implementation of the EU Integrated Maritime Policy, its environmental pillar the Marine Strategy Framework

³ UN Resolution 61/105

⁴ Convention on Biological Diversity

Directive (MFSFD), the EU 'Maritime Strategy for the Atlantic Ocean Area'⁵, the Atlantic Ocean Cooperation Research Alliance⁶ and the CFP.

Instrument: CP – R&D

Year: 2014

**Topic BG.1.2: Marine biodiversity for better valuing marine life
(topic from other services - RTD.I)**

Specific Challenge: Marine biodiversity and ecosystems are essential to the functioning of our biosphere and to human well-being both directly and indirectly through the ecosystem services they provide. However the scale of natural and anthropogenic changes occurring in the oceans and the impact of these changes on marine biodiversity and ecosystems are cause for serious concern. Despite increased attention given to marine biodiversity, the current pace of efforts to protect it is insufficient. Thus in order to ensure a holistic and comprehensive response to rapidly changing marine biodiversity, research is needed to increase our knowledge of marine biodiversity from genes to ecosystems at all relevant temporal and spatial scales and its link to essential ecosystem services of societal benefit.

Scope: Activities under this topic should be aimed at developing spatio-temporal scenarios for biodiversity change supported by ecosystem, socio-economic and climatic models and assessing the implications of those changes in the ecosystem services they provide and related societal benefits. It will be crucial to establish a base-line of marine biodiversity status which will require monitoring and definition of observation protocols and environmental targets. This would enable the creation of a value system to account for provision and loss of marine biodiversity and ecosystem goods and services and to support effective management decisions. Identification of new economic opportunities will be important, through the application of the knowledge generated in areas such as fisheries, aquaculture, biotechnology (e.g. discovery of novel marine bioactive compounds for human health) and maritime and coastal tourism, while preserving marine biodiversity.

Expected Impact: Advance on the preservation of marine biodiversity and more sustainable management and exploitation of marine resources and ecosystems in the EU. Improved science-based policy design and implementation. Achievement of EU and international biodiversity targets (e.g. EU 2020 Biodiversity Strategy⁷, Convention on Biological Diversity (CBD), Rio+20). and improved implementation of the Marine Strategy Framework Directive (MSFD). This topic complements other actions to be supported under Area1.

Instrument: CP – R&D

Year: 2015

Topic BG.1.3: Novel marine derived biomolecules and industrial biomaterials

Specific Challenge: Because of the huge marine biodiversity and the physical and chemical conditions in the marine environment, seas and oceans possess the capacity to

⁵ COM(2011) 782 final

⁶ COM(2013) XXX final

⁷ COM(2011) 244 final

produce a variety of molecules with unique features, unmatched chemical diversity and structural complexity, which explains the increased recognition of marine organism as a source for bioactive compounds with biotechnological, and pharmaceutical application. However, while an increasing number of marine biomolecules-derived products are being commercialized, in the quest to discover interesting new products, more emphasis will be needed to go beyond the current frontiers in terms of both the source of the materials that can be potentially exploited and the technologies currently employed.

Scope: The projects should be industry-driven. They should aim to innovative approaches to go beyond the current frontiers in terms of marine resource identification, supply, improvement on technical aspects of the discovery pipelines (e.g. separation, structure elucidation, identification of the active profile, dereplication strategies etc) as well as production in suitable biological systems. The possible activities are expected to cover the innovation chain from research, to development, and proof of concept. Legal aspects linked to securing access to marine resources, including linked infrastructures and bioresources banks and collections, their sustainable use as well as Access and Benefit Sharing aspects, should be properly considered.

Expected impacts: The projects will strengthen the competitiveness of the European marine biotechnology industry. By reducing the technical bottlenecks in the marine biodiscovery pipelines, improving access to marine resources data and streamlining the legal aspects towards a clear access, the projects will have a structuring impact on the European Research area in this field and will give support to the EU Blue Growth initiative, finally, making the whole sector more attractive to investment by the biotechnology industry.

Instrument: CP – R&D

Year: 2015

Topic BG.1.4: Enhancing the industrial exploitation potential of Marine-derived enzymes

Specific challenge: If we consider the vast reservoir of enzymes identified through the latest large-scale marine genomics and metagenomic sequencing projects the theoretical potential to unveil novel interesting enzymes from marine sources is very high. However, this potential does not automatically guarantee novel commercial products. Current limitations in screening and expression technologies combined with issues of property rights and intellectual property are still limiting factors that deserve further attention.

Scope: The proposers should address the development of technologies for high throughput enzyme screening and/or for the expression of marine enzymes and proteins through dedicated hosts and should focus on respective key research challenges. Screening should take into account industrial technical specifications of the enzymes of interest. Academic and industrial cooperation which is a prerequisite for successful development and further marine-derived enzymes commercialisation as well as any issue related to property rights and intellectual property that could prevent maximising exploitation potential impact should be at the core of the proposals.

Expected impact: Enhance the competitiveness of the European marine biotechnology industry. It is expected that the projects will result in more efficient enzyme identification-to-market success rate, making the whole sector more attractive to investment by the biotechnology industry. Projects will also contribute to realising the

objectives of European policy initiatives, such as the Lead Market in Bio-based Products, and the Blue Growth initiative.

Instrument: CP – CTM Project

Year: 2015

Sub-Focus BG.2: Multiuse offshore platforms – moving economic activities offshore

Topic BG.2.1: Preparing for the future offshore economy (topic from other services - RTD.H, RTD.K, DG ENER)

Specific challenge: Human based activities in Europe's seas and coasts are expected to intensify, diversify and expand further offshore driven by the increasing lack of space available on coastal areas and the exploitation of marine (renewable) energy, biological and mineral resources in the deep sea.

One way, among others, to make use of our seas in a smarter, more sustainable and less disruptive manner is to combine different activities at sea on a same location (e.g. energy production and storage, fisheries and aquaculture, transport & logistics hubs, observation and monitoring). Some EU funded research projects have looked at such options using multi-use offshore platforms⁸.

However the development of large scale offshore activities in deep sea areas necessitates overcoming a series of technological challenges related to e.g. surface support facilities, control systems, fluid and solid transport or remotely operated robots / vehicles. There is a need to 1) assess the most likely economic developments in the maritime economy, 2) the corresponding technological challenges that should be addressed to allow these developments to happen.

Scope: Proposals will analyse and identify the potential socioeconomic developments in the new maritime economy and the most plausible corresponding business models. This will include issues of competing access to marine space between different activities and, more broadly, all social and environmental impacts (including impacts on coastal areas). Proposals will review the existing multi-use offshore platforms and their business models, as well as others that haven't been researched. They will seek to identify the technological challenges to be overcome to make these business models operational.

Proposals will also set-up a mechanism associating key scientific and industrial stakeholders interested in the development of the Blue Economy, with a view to define a shared research and technology agenda to address the offshore challenge and support the advent of the future maritime economy.

Expected impacts: The research will lead to:

- Scenarios and research agenda to unlock the potential of the European maritime economy;
- Mobilisation of key European level key maritime (industrial and scientific) stakeholders to support the Blue Growth agenda;

Support to the EU Blue Growth and marine spatial planning policy objectives.

Instrument: CSA

Year: 2014

⁸ H2-Ocean, TROPOS and MERMAID in FP7-OCEAN-2011

**Topic BG.2.2: Delivering the sub-sea technologies for new services at sea
(topic from other services - RTD.H)**

Specific challenge: The development of a new maritime economy necessitates tackling a range of technological challenges. One such challenge is the ability to remotely execute unmanned underwater operations ranging from simple observation / data collection and transmission of information to more complex industrial operations. Existing technologies derived from marine research (Remotely Operated Vehicles - ROVs, Autonomous Operated Vehicles – AUVs) must be industrialised, i.e. made more robust, reliable and sophisticated (in terms of operating capabilities) and with increased autonomy. Another challenge is the ability to operate at even higher depths (down to 6,000m), and in extreme conditions (e.g. Arctic regions, with corrosive products, heavy / viscous liquids, high pressure - high temperature systems, etc.). The control of the potential impact on the environment of these activities is also important.

Scope: Proposals should address feasibility studies and definition studies (including demonstrators) of the main components required to work undersea. The areas of interest are the following:

- Remotely Operated Vehicles and Subsea Construction systems
- Specialised “Robots” and Autonomous Underwater Vehicles, deployment, recovery and docking systems.
- Subsea “factory” Machineries.

Expected impact: The research will:

- Enable the sustainable exploitation of deep sea resources by European industries and support to EU Blue Growth agenda;
- Increase safety of the existing and new offshore maritime economy;
- Improve the scientific capacity to observe and understand the deep sea environment and resources.

Instrument: CP – R&D

Year: 2015

**Topic BG.2.3: Building with nature – smart and sustainable dredging
(topic from other services - RTD.H)**

Specific challenge:

With 80% of the world's population living in lowland urban areas by 2050, climate change, sea level rise and increase societal demands, surface water infrastructure development in those areas is facing new challenges, particularly the need to balance the sustainable functioning of ecosystems with the demand for development and use.

As regards dredging and hydraulic infrastructures, it is particularly important to utilize natural processes and provide opportunities for nature to be part of the hydraulic infrastructure development process.

While some work has been done to develop the concept, there is a need to push it further to ensure that new ways of undertaking hydraulic infrastructures works fully take into account the value of services provided by ecosystems where they take place. It is also needed to assess how such approaches could be applied in different maritime basins, with their different economic, geophysical and ecological conditions.

Scope: Research requires a multidisciplinary team and approaches involving detailed analyses of physical, ecological and social systems, where hydraulic infrastructure works are made.

The project will review existing knowledge, research and practices in this area. It will select a number of European geographical areas and ecosystems, representative of the diversity of European sea basins. It will seek to apply the building with Nature concept by observing the ecosystem processes and suggest innovative designs for main hydraulic infrastructures / dredging works, including as appropriate technological developments. On the basis of general principles, it will develop more specific guidelines adapted to the different maritime basins / ecosystems. Models and simulation tools will be developed to apply the concept to different conditions.

One (or more) pilot projects will be undertaken, to demonstrate the added value of the “Building with Nature” concept with a particular hydraulic infrastructure.

Expected impact: The research will:

- Increase sustainability and climate resilience of hydraulic infrastructures and dredging works.
- Consolidate global competitiveness of the European “hydraulic infrastructures” industries.
- Promote “building with nature” practices through scientifically based and location-specific design rules and environmental norms that fit better with the local environment.
- Support the development of a blue and sustainable maritime economy.

Instrument: CP – R&D

Year: 2014

Topic BG.2.4: Response capacities to oil spills and marine pollutions (topic from other services - RTD.H)

Specific challenge: The development of deep sea resources exploitation (particularly offshore Oil and Gas) is moving maritime operations to extreme pressure and low temperature conditions, with many unknown factors and limited response capacity.

As shown by the Gulf of Mexico accident in 2010, besides the lack of appropriate means to deal with a large scale pollution event at high depth / pressure, it is particularly challenging:

to predict the evolution of the pollution (e.g. oil spill);

to design an appropriate response combining the right mix of interventions (e.g. mechanical collection, burning oil on surface, use of dispersants, bioremediation, natural dispersion or transformation of spilled oil...).

Recently the Galway event on transatlantic marine research partnership highlighted the need to "Develop and maintain the capacity for rapid response to unanticipated and episodic events that require immediate scientific investigation to advance knowledge”.

Scope: The research should aim at developing an integrated response capacity to major pollution events (particularly oil & gas) in extreme oceanic conditions. The integrated approach should combine oceanographic prediction of the pollution behaviour, understanding of impact of pollution, physical intervention and bioremediation and their impact on ecosystems, the use of specialised vessels and underwater (autonomous) vehicles.

The proposal should improve capacity to predict the evolution of the pollution and its impact on the marine environment as well as the response capacity, with integrated models and tools that can support decision making in the management of such events. It can also cover, as appropriate, recommendations for infrastructure works to help protect sensitive ecosystems in high risk areas.

The research activities should foster transatlantic cooperation.

Expected impact: The research will lead to:

- Contribution to the safety of the new / offshore maritime economy and create a better environment for blue growth investments;
- Preservation of the marine environment and marine ecosystems and protection of coastal economies and communities;
- Contribution to the implementation of the EU regulation on safety of offshore oil and gas prospection, exploration and production activities;
- Improvement of societal acceptance of offshore activities.

Instrument: CP – R&D

Year: 2015

Sub-Focus BG.3: Seabed mining

Topic BG.3.1: Seabed mining – preparing next steps (topic from other services - RTD.K and DG ENTR)

Specific challenge: With the strong development of emerging economies, tensions on the availability and prices of minerals (basic metals like Copper, Zinc, lead, or strategic ones like rare earth minerals) have considerably increased. Part of the solution could lie in the exploitation of deep seabed mineral resources, if this can be made cost-effective and environmentally acceptable. The first commercial exploitation of deep seabed mineral resources is due to start in New Guinea this year but there remains considerable technological and environmental challenges, like specialised vessels or platforms, transport of materials from the deep sea, remote control and automation of equipment, monitoring and mitigating environmental impact. Given the size and scope of the challenge, a range of scientific organisations and industrial technology providers will need to work together in a large scale initiative to 1) define the challenges to be addressed, 2) propose the instrument to address the challenges and the partners to be involved.

Scope: Proposals will review all the work that has been done (e.g. EU and other studies on seabed mining, as well as work undertaken in the framework of the EIP on raw materials), as well as ongoing related projects. It will consider different options for a European large scale pilot seabed mining project, including the selection of a (or more) pilot site(s). Proposals will define the scope of actions to be covered, with a view to answer two essential questions: 1) Is seabed mining economically feasible?, 2) can it be environmentally acceptable?

Proposals will consider legal and regulatory issues that should be addressed to contribute to the definition of standards for seabed mining in the framework of the International Seabed Authority. Proposals will also bring together key players (marine science

organisations and technological providers) that can undertake such an initiative and help define conditions for cooperation between them in the framework of a European action.

Expected impact:

- Create the conditions for a structured large scale initiative on seabed mining, in particular:
- Organise at European level key marine / maritime (scientific and industrial) stakeholders interested in the assessment and development of seabed mining and generate consensus between them on challenges to be addressed;
- Develop a shared research agenda to answer key questions on the economic feasibility and environmental acceptability of seabed mining;
- Enshrine the environmental dimension and the scientific dimension (knowledge of deep sea bio-geological processes) of seabed mining in future European initiatives in this area.

Instrument: CSA

Year: 2014

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Sub-Focus BG.4: Ocean observation technologies/systems

Topic BG.4.1: Developing in-situ Atlantic Ocean Observations for a better management and exploitation of the maritime resources (topic with other services - RTD.I, RTD.H)

Specific challenge: The challenge is to conduct the Research and Innovation activities necessary to the deployment of an Integrated Atlantic Ocean Observing System (IAOOS), building on existing capacities on both side of the Atlantic. The Atlantic Ocean is the most prominent maritime domain situated at the doorstep of Europe. However, the sustainable exploration, exploitation and protection of this maritime domain require a knowledge base and predictive capabilities which are currently fragmented or not yet available. The creation of this knowledge base and predictive capability requires systematic collection of ocean observations recorded both remotely and in-situ. Central to the development of the IAOOS will be the acquisition and use of in-situ observations and their integration with remote sensed data across the whole Atlantic Ocean in order to fill out the existing observational gaps.**Scope:** The Integrated Atlantic Ocean Observing System initiative will cover the Northern Atlantic, and the Southern Atlantic, including the part bordering Antarctica and Arctic. Another focus of the topic will be to fill the observational gaps regarding the in-situ part of the Integrated Atlantic Ocean Observing System including through the use of new ocean observation technologies enabling reducing the costs of in-situ ocean observation and integration of biological and genomic data. The research and innovation necessary to underpin the full and open discovery and access to the ocean observations and facilitating the interoperable exchange of ocean observation as promoted through GEO (Group on Earth Observation) at the scale of the Atlantic Ocean will require the participation of international partners from both sides of the Atlantic.

Expected impact: Enhanced societal and economic role of the Atlantic Ocean in Europe. Increased temporal and geographic coverage of observational data in the Atlantic Ocean. Integration of standardised in-situ key marine observations into process models and forecast systems. Improved modelling outputs and reduced cost of data collection in support of ocean-related industrial and societal activities. Increased competitiveness of European industry and particularly SMEs within the marine industrial sector. Increased safety for offshore activities and coastal communities Informed decisions and documented processes within key sectors (manufacturing, ICT, maritime industry, environment technology, marine science and fisheries). Improved implementation of European maritime and environmental policies (e.g. MSFD, CFP, EU IMP). Enhanced documentation necessary to cope with global challenges such as climate change, scarceness of natural resources and global scale hazards.

Instrument: CP – R&D

Year: 2014

Topic BG.4.2 Acoustic and imaging technologies (topic submitted by RTD.H)

Specific challenge: Acoustic and imaging technologies, combined with data processing, have made considerable progress in the past 20 years and can provide remarkable insights on the state of marine ecosystems, from the water column to the seabed (and its habitats). Acoustic technologies can be active (echosounder, multibeam sonar) or passive (devices to "listen" and interpret marine sounds). They offer promising perspectives for characterising seabed and sea column habitats, species and ecology and can strongly support marine environment and fisheries management, as well as offshore activities and safety (e.g. detection of seeps, geologic events... etc.). The characterisation of seabed sediments, geology, wrecks or debris is also crucial for the development of major offshore projects, particularly in the energy field (offshore wind farms).

Imaging technologies have also proven to be powerful instruments to characterise the marine environment, its biomass, biodiversity and pollution. They can therefore be of important support to marine environment and fisheries management (e.g. marine litter and plastics assessment for the Marine Strategy Framework Directive - MSFD).

Scope: Research could cover innovative technologies to improve the performance of sensors needed for acoustic detection or imaging, as well as the (fixed or mobile) platforms supporting them and signal processing to interpret raw data.

It could be aimed at supporting marine environment policies (MSFD), fisheries management (Common Fisheries Policy), the maritime economy (seabed and sea column characterisation for offshore activities) or safety of offshore activities.

Research projects should bring together marine scientists, technology providers and end-users.

Expected impacts:

- Support to the implementation of marine environmental and fisheries policies (MSFD – CFP).
- Support to the Blue Growth agenda.
- Support to the safety of maritime / offshore economy.

Instrument: CP – R&D

Year: 2015

Horizontal aspects, socio-economic sciences, innovation, engagement with society and ocean governance across the blue growth focus area

Topic BG.5.1: Monitoring and dissemination activities (topic with other services - RTD.I, RTD.H, RTD.K)

Specific challenge: The EU funds a big number of marine and maritime R&I projects spread in different programmes. On the one hand, we lack an overview of (most important) marine and maritime research projects / actions supported by the research framework programme. On the other hand, we lack an analysis of key results of these projects, which could be of use to marine and maritime stakeholders, scientists and policy makers. Identifying main marine and maritime research projects and analysing their results should be the basis for a targeted dissemination of research outputs, in support to maritime industries, marine scientists and policy makers.

Scope: The project should bridge on-going and future FP7 and Horizon 2020 R&I marine-related projects contributing to Blue Growth, during the course of projects or / and after their completion. Projects to be taken into account should come from FP7, CIP, Horizon 2020. (non-exhaustive list, to be reviewed : Marie Curie Actions, ERC, JRC, Research Infrastructures, Cooperation Programme, LEIT , Societal Challenges). A particular importance should be given to integrate and bridge the different projects to be funded through the Focus Area “Blue Growth” during the full course of their implementation.

The project will propose a strategy to identify key marine and maritime research projects and analyse their results, in cooperation with the Commission. It will also propose a targeted dissemination strategy towards key groups of marine / maritime stakeholders (including scientists and stakeholders), as well as policy makers. Attention should be paid to the use of important marine / maritime events (European maritime days, big marine science / maritime industries conferences) as disseminating opportunities. **Expected impact:** Integrating scattered marine and maritime research projects into a wider strategic context, strengthening communication and dissemination of knowledge / technological developments between marine and maritime stakeholders, with the aim to increase impacts on blue Growth and sustainable management of marine / maritime activities; Support the implementation of marine environmental and blue growth policies; Enhance the visibility and impact of marine / maritime research in society.

Instrument: CP – R&D

Year: 2014

Topic BG.5.2: Supporting SMEs efforts for the development - deployment and market replication of innovative solutions for blue growth

Specific challenge: SMEs and young companies have been identified as entities particularly prone to innovate and main job creators. However, as highlighted during the Competitiveness Council of 02 and 03 May, SMEs lack access to finance to develop their activities, in particular in this time frame of economic crisis. Market failures and barriers sometimes hinder promising research and innovation results from finding applications in the market. A better market replication of innovative solutions will support Blue Growth.

Scope: innovative solutions should have already been demonstrated, but never applied in the market. Support the development by SMEs of technologies and services, to the design of products and processes supporting sustainable food security, including organisational and management systems. Innovative business models and behavioural patterns will be demonstrated. Particular attention should be made to integrate the international potential of the solutions developed by the SMEs.

Expected impact: bridging the gap between R&I and applications on the market of innovative solutions contributing to Sustainable Food Security. Making SMEs developing innovative solutions contributing to Blue Growth.

Instrument: SME Instrument

Year: 2014

Topic BG.5.3: Ocean literacy – Engaging with society – Social Innovation (topic from other services - RTD.H)

Specific challenge: The development of the new maritime economy can have significant socio-economic consequences for activities both in the coastal areas and in the offshore (synergies and / or conflicts of use between old and new activities). Projects to study these consequences and facilitate interactions between stakeholders are needed to accompany such developments. Also, given the huge pressures from human activities and climate change on the marine environment, it is crucial to engage with citizens and stakeholders about ocean challenges, raise awareness of marine/maritime activities, and improve acceptability and sustainability through social innovation in addressing these challenges. This is particularly relevant to develop the ecosystem based approach for ocean activities and promote the understanding / protection of marine ecosystem services. The mutual mobilisation and learning tool (as developed in the SIS-MML FP7 programme) and projects to develop ocean literacy and awareness in society (like CLAMER⁹) are particularly relevant in that regard. In addition, it is crucial to have a dedicated effort to monitor marine and maritime research projects in H 2020, extract and disseminate their relevant results in a targeted way to marine and maritime stakeholders, industries and policy makers.

Scope: The activities will focus on compiling existing knowledge in selected marine challenges (e.g. marine litter, eutrophication, noise...). The information will be then turned into materials for dissemination and (pro-active) interaction with societal stakeholders and public at large, in particular through schools, aquariums and scientific museums... etc. Ocean literacy will be promoted in a traditional way (compiled scientific information transmitted to citizens) or in a proactive way (engaging with citizens as responsible actors of change in marine challenges holding legitimate knowledge

Expected impact: Results of these initiatives should support social innovation in the management of maritime activities, contribute to the Good Environmental Status of the marine environment and to the implementation of the Marine Strategy Framework Directive and maximise the impact of H 2020 marine and maritime research on innovation and policy making.

Instrument: CP – R&D

Year: 2014

Topic BG.5.5: Strengthening international cooperation in the field of marine sciences

(topic from other services - RTD.I)

Specific-Challenge: The effects of global change, both natural and anthropogenic have a well-documented impact on Atlantic marine ecosystems and services. Their influence impacts at all scales, by way of abiotic and biotic interactions, from the global scale cascading down to influence services on basin, regional and local scales requiring thus a globalization of the management of the marine environment. At present there is a lack of an international research collaboration framework to address this "grand challenge of sustainable management of the oceans" in an environment of Global Change.

⁹ Climate Change and European Marine Ecosystem Research – FP7 - www.clamer.eu

(There are two options: focus on Atlantic or open the topic to international cooperation in all ocean areas, e.g. Atlantic, Asia, ACP and neighbour countries. Choice will have to be made by hierarchy / cabinet.)

Scope: In order to foster such a framework this action should contribute to: the development of new research collaboration strategies and identify synergies and areas for collaborative action. This effort would require the identification of approaches for implementing and managing collaborative research projects sensitive to national research funding agencies, maximising sharing of existing knowledge (or of new knowledge being generated) and data, identifying best practices for the exploitation of projects results and fostering networking of researchers. To capitalize on knowledge exploitation and its impact this action should develop effective tools to inform and advise policy makers and managers across the Atlantic (/ with Asia / neighbour countries / ACP countries). Importantly, the initiative should contribute to the establishment of an effective cooperation and coordination of research programmes in the EU Member States within an international framework thus creating the basis for the development of future large-scale joint international marine research programmes. Links with Atlantic (/ Asian / neighbour countries / ACP) countries are required.

Expected impact: Effective international cooperation and coordination of marine research programmes between the countries bordering the two sides of the Atlantic, based on a strategy for joint international research programmes in marine sciences. Increased coherence and coordination of international S&T cooperation programmes across Europe building on relevant FP7 activities. Implementation of the objectives of the EU Maritime Strategy for the Atlantic Ocean Area¹⁰ and the Atlantic Ocean Cooperation Research Alliance¹¹ (the IMP Mediterranean / Black Sea strategies).

Instrument: CSA

Year: 2014

BG.5.4 Further consolidating the ERA in marine sciences (topic from other services - RTD.I, RTD.H)

(At last JPI conference in February 2013 in Dublin, it was agreed that the Commission would continue to support JPIs with a second wave of CSAs. There must therefore be a CSA to support JPI Oceans and it should be clarified that this is the CSA to do it. This does not prevent from setting, in the CSA, objectives related to coordination / cooperation / convergence with marine ERA-Nets and article 185 in the marine area, with a view to consolidate the ERA in marine sciences.)

Specific challenge: The process of connecting EU research systems started many years ago with the launch of the ERA initiative and related EU Framework programme instruments, Articles 185 and Joint Programming Initiatives. However to achieve a globally competitive ERA for Europe to play a leading role in addressing grand challenges, such as the ones associated to our seas and oceans, national research systems must be more open to each other and to the world, more inter-connected and more interoperable.

¹⁰ COM(2011) 782 final

¹¹ COM (2013) XXX final

JPI Oceans provides a platform to consolidate the ERA in marine sciences and ensure convergence between the large number of marine research funding agencies and their resources around common strategies. There is a need to continue support this platform while ensuring that it coordinates and cooperates as needed with marine ERA-Nets and article 185 initiatives. **Scope:** This action should target to establish an operational network of marine research funding agencies and other key players in Europe, with a view to ensure convergence between JPI Oceans' strategic research agenda (SRA) and actions implemented in the framework of other national, regional or European initiatives. Consideration should be given to coordination of institutional research budgets, investments (in particular in marine research infrastructures) as well as joint calls. Convergences should be sought between the implementation of JPI Oceans SRA and marine ERA-Nets / article 185 initiatives. The action should also propose measures supporting other ERA priorities such as: improving researchers' mobility, training and attractive careers; facilitating gender equality and gender mainstreaming in research; improving access to and transfer of scientific knowledge including via digital ERA.

Expected impact: Effective trans-national European research networking and synergies among national and EU research programmes in the area of marine science to enhance the overall impact through improved collaboration, synergies and critical mass.
Creation of a European Research Area in marine research.
Enhanced knowledge and technology transfer and innovation between research industry and other stakeholders.
Optimized use and planning of research infrastructures.
Improved policy making including implementation of the EU Integrated Maritime Policy and its environmental pillar, and the Marine Strategy Framework Directive.

Topic BG.5.6: European polar research cooperation (topic submitted by RTD.I)

Specific challenge: Nowhere is climate change more evident than in the high latitudes. Increased shipping for transport and touristic purpose, highly variable fish stock, advancing oil and gas exploration and mining are challenges and opportunities faced in polar regions that require sound scientific knowledge of vulnerabilities and risks in order to develop appropriate regulatory policies. In the 2012 Joint communication to the European Parliament and the Council 'Developing a European Union Policy towards the Arctic Region', the Commission and the High Representative point out that the EU will 'support research and channel knowledge to address the challenges of environmental and climate changes in the Arctic'. Rapid environmental change in the Arctic and parts of the Antarctic continent has global impacts both by accelerating global warming and in a geo-strategic and socio-economic dimension. European countries operate world class research infrastructures in both Arctic and Antarctic regions and are leading in many fields of polar research with regards to climate, ecosystem and other aspects. Making the most efficient use of these resources and latest scientific developments, for addressing the abovementioned challenges requires a high degree of coordination within Europe and beyond.

Scope: This action will coordinate polar research in Europe and develop a comprehensive European Polar Research Programme. By setting up a continuous stakeholder dialogue the action will communicate user needs to the appropriate scientific community and/or research programme managers. The action will also liaise and coordinate with key international partners (e.g. US, Canada, Russia) and international research organizations and programmes related to polar research (e.g. AMAP, WCRP, JPI climate) as well as with relevant operational services including Copernicus. It will support the coordination and optimization of existing monitoring programmes and related infrastructures and work towards interoperability of and open access to observational data and related products.**Expected impact:** Substantially increased scale and ambition of polar research in Europe. Increased coherent and efficient use of European resources. Improved global cooperation. A step change in the domain of open data access, quality control and interoperability. Policy advice at national and EU level and support to the EU's international commitments with respect to the Arctic Council, the Montreal protocol, and UNFCCC and others related to polar sciences.

Instrument: CSA

Year: 2014

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III. Societal Challenge 2 – General Call

Scene-setter:

The Societal Challenge 2 general Call supports key EU policy priorities to address food security, sustainable agriculture, marine and maritime research and the bioeconomy. Actions have been prioritised to tackle specific sub-challenges under each of the activities, with the required critical mass scale and scope, and with maximised impacts. These activities are complementary to the ones supported under the Focus areas calls "Sustainable Food Security" and "Blue Growth".

In particular, activities to promote Sustainable agriculture and forestry will focus in 2014 on the provision of public goods by EU agriculture, on ensuring the sustainability of EU livestock production, and on monitoring sustainable forest management. In 2015 emphasis will be given to supporting innovation in rural areas and fostering better forest management for resilient ecosystems. Activities to promote Sustainable and competitive agri-food sector for a safe and healthy diet will focus on diet and mental health in 2014, and on diet, healthy and safe food in 2015. Unlocking the potential of aquatic living resources will be supported by activities on aquatic farmed animal health, and the reduction of fish discards in 2014, and on climate change impacts on fisheries and aquaculture, and support to fisheries and aquaculture markets and policies in 2015. Activities on Sustainable and competitive bio-based industries will be focused on innovative feedstocks for bio-based industries in 2014, and next generation biorefineries, while in 2015 the focus will be on supporting bio-based markets. These activities will be complementary to those carried out through the Joint Technological Initiative on bio-based industries. Finally, this call includes specific initiatives to support further building of the European Research Area through coordination and co-funding of public research programmes relevant to this societal challenge.

2.1 Sustainable Agriculture and Forestry

2.1.1 Increasing production efficiency and coping with climate change, while ensuring sustainability and resilience

2.1.2 Providing ecosystem services and public goods

2.1.3 Empowerment of rural areas, support to policies and rural innovation

Topic SC2.1.3.1: Closing the research and innovation divide: the crucial role of innovation brokering and knowledge exchange

Specific challenge: In view of fostering economically viable and sustainable development in agriculture and rural areas it is essential to close the research and innovation divide. The Agricultural Knowledge and Innovation Systems (AKIS) are very different between countries, regions and sectors and not fit to answer the challenge to increase productivity and sustainability in agriculture and rural areas. Despite the continued generation of knowledge through scientific projects, research results are

insufficiently exploited and innovative ideas from practice often not captured. The AKIS Collaborative Working Group of the Standing Committee of Agricultural Research advocates the distinction between science-driven research and innovation-driven research, which are governed by different incentives. Cooperation between research and extension or farmers is crucial for innovation-driven research and to be promoted. Mechanisms and networks stimulating this interaction and knowledge exchange, including the end-users of knowledge, should be developed in view of optimising resource use and enhancing the transition to innovation-driven research.

Scope: Activities will connect relevant actors such as innovation centres and innovation brokers and facilitate the exchange of existing knowledge on innovative approaches in agriculture and in rural areas. They will incentivise better exploitation of existing research and capturing of creative ideas from the grassroots-level. Methods for co-generation of innovation driven research should be promoted taking into account the diversity of European regions. Activities include the mapping and development of innovation actors' activities, methods and networks, and the establishment of accessible end-user material on a set of themes. Appropriate attention should be given to innovative tools such as ICT for the benefit of knowledge exchange and to incentivising researchers to engage in co-creation of research and adaptation to needs and geographically diverse conditions. The proposals will involve the main innovation brokers, funders, networks, etc., and for a set of specific themes also the main innovation actors (farmers' organisations, technical institutes, research stations, research institutes and universities, advisers, SMEs, EIP operational groups, etc. as relevant).

Expected impact: Closing of the research and innovation divide in European agriculture and rural areas and a better connectivity between European regions on innovative matters; higher levels of dissemination and implementation of innovation and formats enhancing innovation-driven research; a greater user acceptance of researched solutions for a more competitive and sustainable agriculture; successful deployment of the vast reservoir of existing scientific and practical knowledge, in particular concerning the set of themes; more focused knowledge collection, exchange and dissemination generating a better targeted and shared research agenda for innovation-driven research and multi-actor approaches; thematic networks delivering accessible and long-term available end-user material on the themes; improved skills and education on innovation approaches and a set of thematic areas; improved design of innovation policies and funding schemes incentivizing innovative actions. Outputs of activities will support successful implementation of the European Innovation Partnership (EIP) "Agricultural Productivity and Sustainability".

Instrument: CSA or CP (tbc)

Year: 2014

Topic SC2.1.3.2: Assessing the sustainability of EU livestock production

Specific challenge: Livestock farming systems generate valuable and desirable products for the human diet including some from resources that cannot otherwise be converted into food (grass-based systems). The development of the livestock sector at EU and global level is challenging as it puts pressure on the environment (through gaseous emissions, pollution and ecosystem damage), human health (through zoonotic diseases) and the welfare of animals within the systems. However, animal food products are in growing

demand globally and livestock systems support the development of rural communities (especially in more remote areas). Moreover, extensive livestock systems contribute to the management and maintenance of ecosystems and may increase biodiversity (especially in uplands). Therefore, future and present farming systems need to be (re)designed in a holistic system approach integrating relevant science fields and involving all concerned actors. They need to be integrated in a regional and socio-economic context and deliver social and ethical values to the people working with and in these systems and value to the individual animals living in these systems.

Scope: The assessment of sustainability will be holistic and encompass all facets of the concerned systems. The specificities of the EU system need to be taken into account with due attention to the global trade perspective. The sustainability, resilience and competitiveness of the diverse animal production systems, from ruminants to monogastric animals, from mainstream to organic, from extensive pasture-based or mixed farming to intensive indoor production systems should be considered, as well as the ecosystem services livestock production (can) provide. Investigations will extend to socio-geographic and demographic changes of the concerned farming community and projections, as well as the expected place of animal products in future diets. The innovation capacity/potential in EU livestock production systems is also to be addressed, possibly through the establishment of relevant knowledge exchange networks involving the different categories of concerned stakeholders. Research activities will combine socio-economic work and field research.

Expected impact: The project will shed light on the conditions of sustainability of the livestock sector in the EU and contribute to on-going debates and controversies in the society. It will highlight the main challenges the sector faces, contribute solutions and foster innovations and sketch a roadmap for taking up these challenges.

Additional info: Actions proposed are considered to fall under the concept of "multi-actor approaches" (see glossary)

Instrument: CP - R&D Project

Year: 2015

Topic SC2.1.3.3: Unlocking the growth potential of rural areas through enhanced governance and social innovation

Specific challenge: Smart, inclusive and sustainable growth in the EU cannot be achieved without substantial contribution of its rural areas. The key challenge is to pursue balanced development of rural areas through enabling them to develop their full potential based on their distinctive territorial capital (tangible and intangible) and thus "turn their diversity into strength". Social Innovation relates to the development of new forms of organisation and interactions to respond to societal challenges. It is a collective learning process in which different social groups and actors participate and results in new skills and practices as well as in new attitudes, values, behaviour and governance mechanisms. One example is emergent innovative place-based development approaches, which through collaborative means at a specific geographical scale, address complex socio-economic and environmental challenges. Social innovation is considered as an enabler for a transition towards sustainable agriculture and rural development. There is limited empirical evidence of the extent and outcomes of social innovations and on the conditions that would make them work better. Little is known as to how to support social

innovation, in particular in marginalised rural areas where the social structure is most fragile. This also raises the challenge of promoting institutional capacity building in the most vulnerable rural areas, at the local and regional levels, to develop social capital and skills required to support the creation of successful social innovation.

Scope: research should lead to an improved understanding of social innovation dynamics in agriculture and rural development and how it may be supported and steered in such a way that it produces sustainable agro-food systems and vibrant rural societies. Proposals will establish appropriate methods for evaluating social innovation in agriculture and rural development. Attention needs to be given to different learning arrangements (e.g. multi-actor networks, producer-consumer association, hybrid innovative networks, territorial alliances) as well as on innovative governance mechanisms at various geographic levels, and their potential implications for social innovation. Research will also investigate the role of different policy instruments, other relevant incentives and of diverse entities (public/private, local/non local, active citizens, etc.) as catalysts/constraints to social innovation. Proposals should build on existing research and cover diverse types of rural areas in various Member States and non European countries. Participation of non-European partners (in particular countries of the Mediterranean region) is encouraged.

Expected impact: by shedding light on social innovation dynamics in rural territories and on how social innovation may be supported and steered the research is expected to foster the transition towards sustainable agri-food systems and rural development, ergo smart, inclusive and sustainable growth of rural areas. Improved territorial governance by understanding different innovative governance mechanisms (e.g. collaborative modes of governance) that ensure integrated approach to rural development: mechanisms to coordinate different policies and to ensure appropriate linkages with other areas (rural-urban, rural-rural, cross-regional, etc.). Policy recommendations and case studies, both successful and failures, of social innovation will allow policy makers and the local communities to improve the delivery of their policies as well as to shape such programmes that explicitly foster the creation of sustainable social innovations. An in-depth cross region analysis of social innovation in agriculture and rural development will explain why regions with similar initial conditions display diverging paths.

Instrument: CP - R&D Project

Year: 2015

2.1.4 Sustainable forestry

Topic SC2.1.4.1: Harmonized forest data and monitoring of sustainable forest management

Specific challenge: The significant societal changes over the last two decades and the emergence of a range of new policies affecting forests, in particular on biodiversity conservation, bioenergy and climate change, trigger the need to enhance the viability of a multipurpose EU forestry. Moreover, to continuously play the economic, environmental and social functions forests were traditionally assigned, and provide for the associated public goods, there is also need to build and maintain a consistent record and improve inventory of forest data in the long run, and to maintain viable systems of monitoring of sustainable forest management at the European level. This is currently challenged at the

EU level by the diversity of national and subnational systems of forest inventory and monitoring, which makes the overall assessment of forest data, management measures and policy development difficult.

Scope: Research proposals should concentrate on the consolidation of an EU framework to improve and harmonize forest data and information that would flow into European wide, shared environmental information systems (e.g. European Forest Data Centre-EFDC), including national forest inventories and monitoring of sustainable forest management, able to feed into forest-related international processes and information systems that heavily rely on accurate and updated forest data (e.g. LULUCF) and provide updated information on the status of the resource and the potential for material and energetic use. National forest inventories should build on the existing experience of the EU member states and previous research projects and COST Actions, such as USEWOOD or COST action E43, and make innovative use of both space-applications and field-elevated data in line with on-going EC initiatives on this field. Priority should be given to data and parameters that provide for information required by all relevant policy areas and that are representative for multipurpose, sustainable forest management. These knowledge management systems may also support developing countries to assess, monitor and report on forest data, in the general framework of international cooperation and development (e.g. REDD+, FLEGT, UNFF). Specific procedures, methodologies and products should be readily available for the end-users, i.e. forest administration and management planning entities. Data collected during the timeframe of the project will be made widely available to potential end users through its provision to European forest information systems such as EFDC. To this end, data and metadata generated in the lifetime of the project must conform to INSPIRE guidelines.

Expected Impact: Research outcomes are expected to create the methodologies for an increased harmonization of information derived from forest inventories and monitoring of management measures that will provide data to EU forest information systems. That will further support the development of several forest-related policy areas and feed into other EU and international processes relying heavily on consistent forest information. Through the monitoring of forest management practices, a long-term improved sustainability of the primary sector can be achieved and downstream forest-based sectors benefit greatly as well.

Instrument: CP – R&D Project

Year: 2014

Topic SC2.1.4.2: Forest management models for productive stands and resilient ecosystems in a changing environment

Specific challenge: Among the significant changes to political, social, economic and environmental conditions affecting forests over the last decades, the climate change characterised by increasing global and regional average temperature and higher frequency and intensity of natural disturbances, stands out. This is the more evident for forests compared to other land uses since the lifetime of forest stands spans over a period that is larger than the one climactic changes are observed and addressed, which makes their adaptation potential very limited. Nevertheless, forests are and will be required to play very important social, economic and environmental functions, and provide for the associated public goods and services. EU projects by date addressed the adaptive forest

management from the perspective of forest owner and administration immediate management decision. There is need now to build on these results and develop stand-related silvicultural techniques and forest management models that are responsive to changing environmental conditions on long term, comparable to the forest harvesting age, and that are conducive to increased production of qualitative wood and still meet the increasing and diversifying societal demands on forest resources.

Scope: Further research work should concentrate on the development or, as the case may be, improvement of forest management options/models and silvicultural techniques that optimise the provision of different goods and services throughout the forest lifetime and in accordance with the evolving societal demands. Forests managed under the newly developed models should ensure improved wood quality and higher sustainable yields, and be better adapted to a continuously changing environment, while preserving the forest capacity to provide on long term for essential ecosystem services such as C sequestration, conservation of biodiversity, regulation of water, soil and nutrient cycles, or recreation activity. Procedures, methods and techniques characterising the newly developed models should be readily available for end-users, i.e. forest administration and shall deem acceptable for the main forest policy actors.

Expected Impact: The management systems and associated silvicultural techniques will enhance wood production to secure its sustainable and affordable supply for material and energy use, while assuring protection of the natural resources and ecosystems. This will lead to more certainty in the economic and policy arena regarding the availability and sustainability of forest resource and products, which can further incentivize investments and development in the downstream sectors.

Instrument: CP – R&D Project

Year: 2015

2.2 Sustainable and competitive agri-food sector for a safe and healthy diet

2.2.1. Informed consumer choices

Topic SC2.2.1.1: Diet, impulsivity and compulsivity

Specific challenge: Impulsivity (including aggressiveness and other antisocial behaviours) and compulsivity disorders (including addiction) 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 activities 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 ethical and 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.

Expected impact: 1) The activities are expected to deliver an impact in terms of social innovation and public health, through filling knowledge gaps in the understanding of the influences of nutrition, lifestyle and the socio-economic environment and their complex interdependencies on the occurrence of impulsivity and compulsivity disorders. 2) The activities shall deliver a list of remedial actions for this challenge that can be used by policy makers, politicians, practitioners, stakeholder groups, employers and concerned families or individuals.

Instrument: CP – R&D Project

Year: 2014

2.2.2. Healthy and safe foods and diets for all

Topic SC2.2.2.1: Tackling malnutrition in the elderly population

Specific challenge: The EU is confronted with the challenge of an increasing ageing population. This demographic change touches upon several areas of society and has socio-economic implications. Studies show that changes in body composition, organ function and the ability to eat or access food as well as inadequate dietary intake and the partial loss of taste and smell are associated with aging, and may contribute to malnutrition. Malnutrition and weight loss, which are seen to develop more easily in the elderly, can lead to immobility, skeletal disorders, insulin resistance, hypertension, atherosclerosis and metabolic disorders. Malnutrition also significantly affects the quality of life of the elderly, thereby reducing physical and psychological functioning and thus the ability to carry out activities of daily living. The related health care costs are expected to increase in the next decades. The aging process alone does not usually cause malnutrition in healthy and active elderly people having an appropriate lifestyle. Therefore, one of the main requirements of elderly care is to provide an adequate diet with all essential nutrients. More research in this area will promote great economic and social opportunities related to demographic changes.

Scope: Based on a better understanding of the mechanisms of ageing process, strategies to prevent malnutrition in the elderly (at home, in ambient assisted living, in nursing homes, in hospitals, and/or in an emergency context) will be developed. Dietary recommendations to prevent functional decline will be developed with the aim to improve the appetite, the health and the quality of life of the elderly. Innovation of food products and a holistic strategy to prevent malnutrition in the elderly need to be developed, including the role of (micro-)nutrients in the healthy human organism (from physiology of intake, bioavailability and uptake by the human organs, to their role and interaction with other nutrients), the specific nutritional requirements, the specific dietary behaviours and preferences of the older population, the gender dimension, ethical aspects, and the development of relevant new food products and services. Participation of relevant partners from third countries such as AU, NZ, CA and/or US is encouraged. Relevant stakeholders, including industry and SMEs should be involved.

Expected impact: Generate a better understanding of the nutrition effect on ageing process. Improvement of the quality of life of the elderly. Evidence base for more effective and safer strategy and intervention promoting an active and healthy ageing. Cost savings in health systems. Promotion of cooperation and dialogue between different stakeholders (food industry, nutritionist, clinicians, etc.). Contribution to the European Innovation Partnership on Active and Healthy Ageing, and to the competitiveness of the European food industry.

Instrument: CP – R&D Project

Year: 2015

Topic SC2.2.2.2: Assessing health risks of combined human exposure to food related toxic substances

Specific challenge: Risk assessment has long been the tool for science-based decision making and has become an integral part of the formulation of EU policies. Specifically, with regard to chemical hazards, there is an increased concern about possible ‘cocktail effects’ and the need to assess them. The complex toxicology of chemical mixtures and the diversity of the routes of exposures both request for the development of a more mechanism-based and quantitative framework for risk assessment, thereby increasing the efficiency and effectiveness of safety evaluations.

Scope: The state-of-the-art frameworks already in practice at international level should be reviewed in order to reach a harmonised approach. Research should focus on the health risks of combined exposures to multiple chemicals from multiple sources. New strategies – using ‘omics’ technologies, mathematical modelling, QSARs, TTC etc. – will need to be explored, so that tiered approaches for testing can be followed and targeted testing protocols can be developed, taking into account the relevant information about related chemicals.

Expected impact: The new strategies and approaches on risk assessment will help limit the use of animals in toxicological research. The development of systems and tools to assess the health risks of combined exposure to chemicals will help underpin the scientific advancements in safety assessments and place risk assessment practices in Europe at the forefront of international developments in this area.

Instrument: CP – R&D Project

Year: 2015

2.2.3 A sustainable and competitive agri-food industry

Topic SC2.2.3.1: Edible oils and fats

Specific challenge: Although the EU consumer has access to a diverse range of edible oils and fats, numerous issues related to their production, processing, consumer acceptance and health effects remain unresolved. The environmental and economic sustainability of producing the raw materials used for new and emerging edible oils and fats are unclear, e.g. the impact of monocultures on local markets, and the optimal and/or potential growing regions (Europe, Asia and/or Africa). Questions related to the optimal processing methods (e.g. the generation of undesirable substances such as trans-fatty acids), location (EU or other chances for smart specialisation), environmental impact (e.g. transport), authenticity (e.g. blending of different – olive and other – oils), and legal

issues (e.g. authorisation procedures of novel foods) have remained unanswered. The consumer acceptance of new and emerging, healthy and sustainable edible oils and fats, as well as other factors related to market uptake, need further clarification.

Scope: Research and innovation activities will require a multidisciplinary approach, taking into account production, processing, transport, environmental, consumer, marketing, and health issues. Commercialisation / market uptake of new or improved products should be taken into account in the proposal, including (validation of) the market potential and economic viability for the producer and of functional and economic added value for the consumer. Food safety and quality parameters will also need to be considered, for example analytical methods for safeguarding authenticity. Health-related risks and benefits of new and emerging edible oils and fats need to be taken into account, including caloric content, allergens, cholesterol, and carcinogenic properties. Uptake of this knowledge by industry will need to be addressed, with a specific focus on SMEs. Because of the non-EU origin of certain edible oils and fats, participation of third countries is encouraged.

Expected impact: The overall impact is to improve the quality of oils and fats, to introduce new or improved oils and fats to the market, and to make their production and processing more sustainable. Social innovation due to Fair Trade/fairer trade can also be expected. These production and processing methods will contribute to the further strengthening of the EU economy, with a specific focus on SMEs and small-scale food-processing. Finally, the market uptake of healthy edible oils and fats (existing, new or emerging) will contribute to promoting a healthy diet.

Instrument: SME Instrument

Year: 2015

2.3 Unlocking the potential of aquatic living resources

2.3.1 Developing sustainable and environmentally-friendly European fisheries

Topic SC2.3.1.1: Towards a gradual elimination of discards in European fisheries

Specific challenge: The new orientation of the CFP calls for a move towards a gradual elimination of discards on a case-by-case basis, and taking into account the best available scientific advice to reduce unwanted catches and gradually ensure that all catches are landed. To do so, and to obtain better economic results while keeping consistency with the objectives of the Common Fisheries Policy, particularly about compatibility with Maximum Sustainable Yield., there is a need to underpin innovations and changes in the tools and technologies used at all stages of the fish food chain, from catching to consumers.

Scope: The topic will deal with the several keys aspects underpinning the new policy

i) how to avoid unwanted catch both through improvements to selectivity but also through adaptations to fishing strategies, ii) how to make best use of unwanted catches without creating economic incentives and inadvertently developing markets for such products, iii) how to estimate the possible consequences for the marine ecosystem of the removal of biomass hitherto discarded at sea and iv) how to control and monitor compliance of the new rules. i) how to avoid unwanted catch, ii) how to make best use of caught fish without creating economic incentives not to avoid by-catch when this is

required and iii) how to estimate the possible consequences for the marine ecosystem of the removal of biomass hitherto discarded at sea iii) how to control and monitor compliance of the new rules.

These issues need to be addressed separately concerning unwanted catches of undersized fish, and of unwanted catches of fish larger than the conservation reference size.

The topic will address in particular innovative technologies and practices, as well as simulation modelling of harvesting unwanted catches, to reduce and avoid discards, such as behavioural adaptations and technical changes, as well development of new and novel tools for monitoring with particular emphasis on small-scale fisheries.

In addition, it will address issues related to the handling and disposal of unwanted catches in a way that is cost neutral and does not create situations where the market value of fish which are not landed for human consumption is sufficiently high to motivate the development of a targeted fishery.

New methodologies to treat fish that otherwise would be discarded including sorting, stocking, preserving, and processing on-board vessels. The work area will include developing ways to utilise and cover the handling costs for fish that are normally discarded now, due to low commercial value, small size fish, and poor conservation.

Furthering efficient disposal may include food processing and marketing, extraction of co-products by biotechnology conversion from a variety of marine organisms e.g. fish meal, fish oil, enzymes, new drugs, but the use of undersized fish for human consumption in any form is not allowed.

Finally, the work will address economic and social dimensions of the above-mentioned problems and will create bridges between cutting-edge research and technologies, fishermen, processors, wholesalers, retailers and consumers.

Expected impact: Support through research and innovation key orientation for the CFP regarding discards elimination and landing obligation. Contribute to implement the MSFD requiring moving towards good environmental status and in particular the descriptors related to 1: biological diversity, 4 the marine foodwebs abundance and diversity and 6 seafloor integrity.

Instrument: CP – R&D Project (with cascading grant)

Year: 2014

2.3.2 Developing competitive and environmentally-friendly European aquaculture

Topic SC2.3.2.1: Tackling disease related challenges and threats of European farmed aquatic animals

Specific challenge: Disease prevention and management are essential for the sustainability of the European aquaculture industry. The diversity of species and farming practices throughout Europe involves also a significant number of threats related to a large variety of pathogens that hamper production and require specific preventive and curative practices and tools ensuring a high level of biosecurity of aquaculture production and related seafood products. Among other disease-related threats, parasites and related infections can cause significant damages on farmed fish species and can result in poor growth performance, impaired welfare and death of farmed animals with significant consequences in terms of production and economic losses. Parasites can also affect the end users of aquaculture products and therefore their monitoring and eradication are

essential for ensuring the safety of European consumers. The management of diseases is even more challenging in farmed aquatic mollusc where the absence of adaptive immune system further complicates the development of tools and methods allowing mitigating effects of diseases on production. Despite the initiatives that have been implemented to understand, explain and mitigate disease outbreaks affecting farmed molluscs, which seem to have multifactorial origins, the future of the European mollusc production sector is still challenged.

Scope: Under this large initiative emphasis will be given to two particular aspects concerning two different segments of the European aquaculture. The first aspect of the topic will consider only parasites with demonstrated/documentated socio-economic impact on European finfish aquaculture production and/or seafood trade. It will aim at improving our understanding of parasite life-cycles/stages and interactions with their hosts of commercial interest. This will include investigations on the role of environmental factors in parasites resistance (within and outside their hosts) and disease development. It will also explore relevant mechanisms and propose solutions to minimise transmission and impact of disease and will address risk analysis and infected stock management. It will also identify practices that might contribute in increasing or reducing the risk of parasite infections and will develop tools and methods for ensuring high levels of biosecurity adapted to relevant life stages and husbandry practices of European farmed finfish species. The main focus will be on the development of reliable detection and diagnostic tools, as well as, on trustworthy and cost-efficient preventive and curative practices, medicines and treatments for both conventional and organic aquaculture, that comply with relevant legal frameworks. The interaction between farmed and wild populations in terms of epidemiology of parasitic infections might also be addressed.

The second aspect of the topic will consider only pathogens that have a demonstrated/documentated impact on European aquatic farmed mollusc production. It will contribute in identifying production site characteristics that might be more appropriate for reducing the risk of disease outbreaks. It will also investigate means of minimising transmission and impact of diseases and will address risk analysis and management of infected farmed molluscs. It will also address the genetic variability of relevant pathogens and will consolidate the basis for farmed and wild mollusc resistance/tolerance to relevant pathogens, to define effective antimicrobial defence mechanisms, develop programs on genetic selection of mollusc strains resistant/tolerant to the most relevant pathogens and study the resistance of selected animals to other pathogens.

Particular focus will be put in investigating the genetic diversity of OsHV-1 and related viruses in order to better understand virus spread, pathogenicity and key drivers of virus emergence (in different parts of the world) including effects of global climate change. This should contribute in developing a network between Australia, New Zealand, Canada, USA, Japan, Korea and EU in order to share information about oyster mortality events related to OsHV-1 and its different genotypes.

Expected impact: Availability of efficient solutions to prevent and mitigate/eradicate the impact of diseases that impede the development of the European aquaculture sector. Improved health and welfare of European farmed species resulting in increased productivity of European aquaculture production. Containment, minimization of impact and management of disease outbreaks and infected stocks. Compliance with existing legal framework related to authorised anti-parasitic treatments for aquaculture and to

seafood safety. Improved traceability and safety of European and imported seafood products. Improved biosecurity that will contribute to better economic returns, increased competitiveness and better image of the European aquaculture sector. Built an international network including the main oyster producing countries and allowing the exchange of best practices in terms of OsHV1 surveillance, epidemiology, diagnostics, selection of resistant oyster strains, husbandry.

Instrument: CP – R&D Project

Year: 2014

Topic SC2.3.2.2: Building a dialogue platform on aquaculture between EU and Latin America

Specific challenge: Latin America is expected to become one of the new world aquaculture leaders. Although most of the production is currently based on few species (salmon, trout, tilapia, shrimps and mussels) the large (and largely untapped) biodiversity potential fuels the on-going diversification processes that concerns already roughly 90 species. Although the main production countries are Chile, Brazil, Ecuador, Mexico and Colombia, aquaculture is developing in other parts of the continent. The available natural resources, environmental conditions, space availability and human potential promise a bright future for aquaculture in Latin America that already figures among the main providers of the USA market for several farmed species. However, several challenges and obstacles need to be considered and overcome for the promise to be met.

Scope: The topic will focus on identifying issues of common interest between the EU and Latin American countries with high potential for aquaculture development. It will contribute in building a dialogue platform involving all relevant stakeholders: aquaculture producers, supporting services and technology providers, policy makers, NGOs and scientists. It will focus on promoting best practices for the development of sustainable aquaculture production, ensuring high levels of environmental protection, animal welfare and seafood safety. It will also contribute in identifying and creating synergies among existing cooperation initiatives in the field of aquaculture involving key stakeholders from EU MS/AC and Latin America.

Expected impact: Coordinate dispersed on-going MS's initiatives with Latin American partners in the field of aquaculture. Create win-win opportunities for aquaculture operators and service providers from EU and Latin America. Disseminate best practices and standards that guarantee level playing field in the global market and high level of protection of seafood consumers.

Instrument: CP – R&D Project

Year: 2014

Topic SC2.3.2.3: Implementation of an Ecosystem-based approach for European aquaculture

Specific challenge: Access to water and space are among the main challenges faced by the European aquaculture operators. In particular, the lack of space is one of the factors hindering the expansion of EU aquaculture; subsequently it is necessary to identify the most suitable sites for aquaculture, while other accommodating needs of other competing activities and taking into account views of local stakeholders and the interplay between public and private sectors. Therefore, establishment of reliable (inland and coastal)

spatial plans will be essential for facilitating investment and development of European aquaculture. Another important limitation comes from the difficulty in complying (cost-) efficiently to the national and European environmental legislation, namely the WFD and MSFD. Aquaculture needs a high quality environment for ensuring the production of high quality seafood products and is sensitive to other human activities that may affect negatively (mainly through organic wastes) fresh water and marine ecosystems. On the other hand, some aquaculture production segments can negatively affect the environment. Ensuring the environmental sustainability of aquaculture practices is essential for the complying with the existing regulatory framework and will also contribute in improving the image of the European sector.

Scope: The aim of the topic will be to provide operational tools to support national administrations in identifying the potential for aquaculture to expand in Europe in terms of space requirements and conflicts with other users. It will compile existing and develop new tools for predicting and assessing the carrying capacity of the ecosystems at different geographic scales, taking into account husbandry specificities of the main European aquaculture segments. It will focus on improving existing and/or developing new integrated (including all the components of the ecosystem) operational tools for the timely and cost-efficient environmental impact assessment in line with the requirements for the authorisation of licences for aquaculture businesses in the main aquaculture producing European countries, as well as, for the implementation of the requirements set by the MSFD in relation to aquaculture operations. It will also develop cost-efficient aquaculture effluents management tools and practices. Finally, it will develop adequate methodologies and will assess the environmental and ecological services provided by European aquaculture farms.

Expected impact: Contribute in creating enabling conditions for facilitating investments in European aquaculture. Provide tools for reliable prediction of environmental impacts of aquaculture operations, as well as, for quantification of environmental services provided by the sector. Provide operational tools allowing national administrations to reduce the cost and time for delivering licences for aquaculture operators. Contribute in enhancing the image of the aquaculture sector. Support the MS in developing and implementing the Strategic Guidelines for the sustainable development of European Aquaculture.

Instrument: CP – R&D Project

Year: 2015

Topic SC2.3.2.4: Ensuring economic sustainability and competitiveness of European fisheries and aquaculture sectors to reap the potential of seafood markets (INCO dimension)

Specific challenge: Both fisheries and aquaculture take place in the interface between a biological production process, a technological system, the environment and the market chain. Control of the production process, as well as biological and environmental sustainability, are necessary but not sufficient conditions for economic sustainability, which is defined as the long term economic viability of a seafood production enterprise. One of the main challenges for fisheries and aquaculture in Europe is to adequately deal with competition. At the moment the sectors face competition in the global marketplace, both for inputs and for outputs. In addition, the limited availability of appropriate

production and socio-economic data hampers the development of reliable models and prediction tools. Meeting these challenges is necessary for ensuring the long term economic sustainability of European fisheries and aquaculture sectors.

Scope: The topic will focus on the economic sustainability of European fisheries and aquaculture production segments, systems and products, taking into account supply chains and markets. It will consider the effects of cost of production, productivity growth, market development, supply chain organizations, demand and supply characteristics, international trade price fluctuations, innovation and product development on fisheries and aquaculture production systems and products. It will investigate the organisation of the value chain and the establishment of prices cycles, including in particular the “boom and bust” cycles that have caused substantial bankruptcies of aquaculture operators in several countries and will propose solutions for predicting and avoiding similar situations in the future. In addition, the impact of different regulatory systems on the profitability and sectors development will be evaluated.

The topic will also focus on the dynamics of European and global seafood markets and will explore the potential of fisheries and aquaculture products for competing in this context. It will explore the interaction between European fisheries and aquaculture products in local and global markets. It will identify and analyse successful seafood products and will investigate the potential of existing marketing tools in support of responsible practices (labels, certification schemes etc) and of market niches to boost the competitiveness EU fishing and aquaculture industry.

Particular emphasis will be given to the development of tools and models aiming at supporting fisheries and aquaculture operators in better planning their production and developing new products, taking into account the dynamics and trends of their potential markets, as well as the needs and expectations of consumers. Finally, it will compile and quantify non market values of fisheries and aquaculture.

Expected impact: Support the economic sustainability of European fisheries and aquaculture operators. Allow fishermen and aquaculture producers to better understand and benefit from the functioning of their markets. Provide tools for production planning and development of novel products and markets, taking into account trends in the local and global seafood value chain. Boosting the competitiveness of European seafood products by identifying the added value of existing marketing tools and their potential in steering European consumers' choices.

Instrument: CP – R&D Project

Year: 2015

2.4. Sustainable and competitive bio-based industries

2.4.1 Fostering the bioeconomy for bio-based industries

Topic SC2.4.1.1: Supporting biorefineries development through the broadening and optimisation of available biomass crops

Specific Challenge: Fostering innovation for the production of quality biomass feedstock for the biorefineries, is core to the EU Bioeconomy. The so called lignocellulosic biomass, which includes non-food crops, is the most abundant renewable biomass feedstock and as such central for the successful implementation of the integrated

biorefineries. The challenge to be considered here is the need for Europe to increase the availability of its lignocellulosic biomass feedstocks in an economically and environmentally sustainable way, all broadening the spectrum of possible biomass crops sources and optimising their composition.

Scope. Research and innovation activities should focus on the optimisation of biomass crops production and/or composition, especially for novel, undomesticated or neglected species, for their use in integrated biorefineries. They should take into account crops tolerance to marginal environments and the need to move the field beyond model species. The concepts should take into account the cascading approach and focus on added value products (e.g. fibres composites). They should integrate the modern genetics, biochemistry and agronomy needed to fully exploit the feedstock industrial potential. Projects should include demonstration activities to prove the techno-economic viability of the proposed concepts. The overall economic, social and environmental sustainability approach as well as its Life Cycle Assessment should also be critical elements of the project.

Expected impact: Broadening feedstock sources for production of lignocellulosic biomass to help realise economically sound and sustainable integrated biorefinery. Improvements in production of biomass crops in the field beyond model species. Adaptation of biomass crops for development of novel high value bio-products (e.g. fibre-based composites, chemicals, nutraceuticals) to increase value of biomass used in a biorefinery. Improved use of marginal lands, linked to societal and environmental benefits. Strong SME participation in the project itself should contribute to the realisation of the expected impact.

Instrument: CP – R&D [TRL 4 to 6]

Year: 2014

Topic SC2.4.1.2: Expanding the range of bioactive natural compounds available for industrial application

Specific challenge: Nature is a rich source of novel bioactive compounds and molecules for industrial applications e.g. pharmaceuticals, agrochemicals, fine chemicals or cosmetics. Bioactive natural compounds based industrial products are increasingly reaching our markets. However, it is estimated that only 10% of all terrestrial plants have been characterised biochemically, and this percentage is even lower when coming to their characterisation for industrial applications. In addition to this fact, many of the target compounds of interest are only produced in very small amounts, and frequently by endangered and/ or slow growing species. The main challenge here thus will be to increase the range of natural bioactive compounds available for industrial use. To do so efforts on bioprospecting, characterisation and increased productivity of target products will be required.

Scope: In order to expand the range of novel bioactive natural compound plant based products, comprehensive and integrated efforts are needed that focus on industry's requirements. Full value chain approaches to tackle main bottlenecks from bioprospecting to product development, should be integral to the proposals. Bioactive natural compounds which may only be produced upon plant interaction with other organisms, such as fungi, microorganisms or other plants, or under abiotic stress could also be considered. The projects under this topic are to be industry-driven. The techno-

economic viability of the proposed concepts as well as the overall economic, social and environmental sustainability approaches are to be duly considered. Access and Benefit Sharing (ABS) issues will be carefully taken into account.

Expected impact: It is expected that this topic will expand the range of natural molecules for pharmaceutical and industrial purposes. It will advance knowledge on interactions of plants with their environment, and improve chemical production processes. It will ensure European feedstock flexibility and access to raw biomaterials for the European industries, with full compliance with ABS-related regulations, as well as improve knowledge related to biodiversity issues. Strong SME participation in the project itself should contribute to the realisation of the expected impact.

Instrument: CP – R&D [TRL 4 to 6]

Year: 2014

Topic SC2.4.1.3: Meeting the demand for renewable oil crops as a source of bio-based products

Specific Challenge: At present, oils crops are the most widely used renewable raw materials in the chemical industry. Indeed, bio-based products such as bioplastics, lubricants or added value fine chemicals are already nowadays produced from oil feedstock. With the opening of new markets for these products the demand for oil crops is increasing. The challenge for Europe here is to sustainably match this demand without increasing our dependency on external biomass or competing with food production. The development of dedicated and optimised industrial oil crops, the full use of the biomass in a cascade approach as well as the environmentally sound and sustainable use of natural resources will be key to meet this challenge.

Scope: Proposals should move beyond model species to dedicated and optimised oil crops adapted to industrial needs. Research should encompass full use of biomass oil including vegetative tissues and ensure efficient exploitation of the residual biomass. They will also address bottlenecks such as extraction and purification of specific bio-based products and ensure development of oil production with sufficient quantity, quality and homogeneity. The concepts should take into account the cascading approach and focus on added value products. Strong weight will be put on the industrial leadership. Projects should include demonstration activities to prove the techno-economic viability of the proposed concepts. The overall economic, social and environmental sustainability issues as well as its Life Cycle Assessment should also be critical elements.

Expected impact statements: The research pursued under this topic is expected to broaden the range of suitable oil feedstock candidates and develop new economically and environmentally viable end bio-based products. It will also improve critical aspects found along the value chain from the cultivation issues, to optimisation of desired biochemical parameters, extraction of oils and other biomolecules and to development of industrial end products. The expected project results should clearly be of interest and potential benefit of SMEs. A strong participation of SMEs in the project itself should help contribute to the realisation of the expected impact.

Instrument: CP – R&D [TRL 4 to 6]

Year: 2014

Topic SC2.4.1.4: "Green factories": Innovative plant molecular farming approaches

Specific challenge: Plants have a proven track record as production platforms, so called, "green factories", for high added value recombinant proteins such as biopharmaceuticals or innovative industrial enzymes. Plants as green factories will provide both economic and safety advantages over conventional production systems. Industrial interest on this field has grown rapidly in the past years. Major challenges still hampering the full economic and technical deployment of plant molecular farming include the need for these systems to ensure high protein expression yields, the recombinant protein authenticity as well as the efficiency of obtained final products.

Scope: Projects under this topic should be industry driven and focus on the demonstration of innovative technologies for molecular farming approaches. Higher plants, mosses or algae can be considered. Bottlenecks such as the optimization of gene expression, use of proper cell lines, and maximizing efficiency of downstream product purification should be considered. Projects could also encompass issues related to protein stability and degradation and/or improvements of bioreactor design, and culture parameters. Furthermore, the authenticity challenge should be addressed. The techno-economic viability of the proposed concepts, the overall economic, social and environmental sustainability approach as well as its Life Cycle Assessment should also be critical elements.

Expected impact statements: It is expected that plant-based protein production platforms will be upgraded to the level of currently more advanced microbial systems, opening thus full range of additional benefits arising from plant based production (scalability, absence of shared pathogens, high efficacy). This will create an efficient and cost-effective alternative methodology for protein production for biopharmaceuticals or industrial biotechnology use. The expected project results should clearly be of interest and potential benefit of SMEs. A strong participation of SMEs in the project itself should help contribute to the realisation of the expected impact.

Instrument: CP – CTM [TRL 4 to 7/8]

Year: 2015

2.4.2 Developing integrated biorefineries

Topic SC2.4.2.1: Converting CO₂ into chemicals

Specific challenge: CO₂ originating from the use of fossil resources continues to accumulate in the atmosphere, accelerating climate change with disrupting impacts on the biosphere. The chemical industry which mainly relies on these unsustainable and scarce fossil resources is looking for renewable and sustainable alternatives which will allow them to deliver the chemicals our society needs without the related environmental burden.

Scope: To tackle these challenges, proposals should address ways to use CO₂ from the atmosphere or captured in industrial processes as a direct feedstock for chemicals production beyond algae biorefinery concepts (algae). This biorefinery model is particularly attractive for regions where the biomass availability is less plentiful, as it is the case in Europe. One or several routes that involve the conversion of CO₂ into valuable chemicals (e.g. methanol, carbonates, organic acids, etc) should be explored,

such as (photo) catalytic or biochemical enzymatic ones which will include for example the use of microbial electrosynthesis (production of chemicals and fuels at the cathode of a microbial bioelectrochemical system) or synthetic biology to construct artificial carbon fixation pathways that are more efficient than naturally occurring ones.

Expected impact: The development of technologies for the conversion of CO₂ into chemicals can result in the design of industrial processes with zero or even negative greenhouse gas emissions. The technological conversion of CO₂ into chemicals is a real opportunity for our economies to create a new market and improve the quality of our environment. The scale of CO₂ availability as feedstock offers great potential to couple environmental protection and economic growth.

Instrument: CP – R&D [TRL 3-5]

Year: 2015

2.4.3 Supporting market development for bio-based products and processes

Topics SC2.4.3.1: Public procurement networks on 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 €2000 billion, or 16% of GDP, on goods and services yearly. Many product areas could potentially feature products made entirely or partly from renewable raw material. Likewise, many types of services could potentially benefit from bio-based inputs.

By introducing requirements for sustainability in tender specifications, the demand from public authorities could significantly increase the market for bio-based products and drive technological innovation in this market area.

Scope: The proposal should undertake coordination and support activities to investigate the feasibility and prepare the launch of a PPI on biobased products. Activities should include the identification of procurement needs that are common to the participating public procurement bodies; Determining the state-of-the art of potentially available bio-based products of interest; Developing common, functional/performance based requirements specifications including the need for standardised measurement and testing methodologies, other approaches for criteria setting and their verification as well as intensifying the link between public procurers and standardisation bodies sharing information and facilitating collaboration; Improving procurers knowledge and capabilities by joint trainings, workshops and other networking activities; Carrying out the necessary legal work to ensure that the procurement complies with European and national law. Engaging on public dialogue on biobased products

Expected impact: Preparing the grounds of a PPI on biobased products as a key demand-side trigger for innovation with the final aim of lowering barriers and increasing bio-based products market segment.

Instrument: CSA

Year: 2015

2.5 Cross-cutting actions covering all the activities

Topic SC2.5.1: Building a dialogue platform on agro-food between EU and China

Specific challenge: tbd after Commissioner Cioloş' visit to China in July 2013

Scope: tbd after Commissioner Cioloş' visit to China in July 2013

Expected impact: tbd after Commissioner Cioloş' visit to China in July 2013

Instrument: CSA

Year: 2015

Topic SC2.5.2: Engaging society, reaching end users and linking with policy makers for a participative governance of the bioeconomy

Specific challenge: The lack of information and debate on the bioeconomy, on the related research and innovation activities and on its societal implications jeopardises the development of a sustainable Bioeconomy in Europe. Lack of response to citizens' concerns, lack of support to new promising markets, conflicting policies are examples of barriers hindering the realisation of the full potential of the Bioeconomy for our societies and economies. National and regional multistakeholder bioeconomy platforms are therefore needed to promote open debates leading to the preparation and implementation of coherent and widely accepted national and regional bioeconomy strategies tackling these challenges. In addition, it is important that European citizens develop a wider understanding of what the bioeconomy is and participate in the debate on the opportunities it offers and the challenges it sets.

Scope: The proposals should 1) address the creation of national and regional multistakeholder bioeconomy platforms and 2) foresee high impact information and debate activities on the overarching concept of the bioeconomy. The platforms will enable national and regional policy makers to participate in discussions with different interest groups – such as scientists, business, NGOs, etc. – and should create conditions favourable to the development of balanced and informed national and regional bioeconomy strategies. The information activities will first identify key influential groups – such as students, media, universities ... – and then focus on targeted actions for involving these groups in the debate on the bioeconomy, allowing them subsequently to spread the message to the European citizens at large.

Expected impact: Stakeholder engagement and public outreach activities will improve the availability and quality of information on bioeconomy products and processes, including their social, economic and environmental impact. They will provide European citizens ample opportunities to debate new findings and their implications in the bioeconomy sectors and value chains. They will enable legitimate societal concerns and needs to be identified and taken into account in bioeconomy strategies. They will underpin the responsible development of the bioeconomy, by facilitating the uptake of research results in the different sectors of the bioeconomy and by creating close links between the research and innovation chain and policy making.

Instrument: CSA

Year: 2014

Topic SC2.5.3: Bridging across Horizon 2020 research and innovation projects in food security, sustainable agriculture, marine and maritime research and the bioeconomy

Specific challenge: More integration and links are needed throughout all steps of the research and innovation chain, in order to facilitate the flow from discovery to market applications and speed up the innovation process. The EU is funding several R&I projects

spread in different programmes or spread across programmes. Projects of different kind, scope, size are often isolated and lack integration. Results are often not optimally disseminated nor fully exploited, and skilled researchers involved in projects often do not find the appropriate outcomes to their findings.

Scope: To create links among different research and innovation activities carried out in different parts of Horizon 2020 and relevant to societal challenge "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy", in order to facilitate the delivery of innovative solutions under these areas. A main objective will be to channel the relevant scientific and technological knowledge produced as a result of bottom-up research under Horizon 2020 *Excellent Science* (ERC, Marie Curie Skłodowska, FET, EIT, Research Infrastructure) and *Industrial Leadership*, in order to feed further research and innovation tackling this societal challenge and the related Focus Areas "Sustainable Food Security" and "Blue Growth". The activities should foster the bridging of on-going FP7 and Horizon 2020 projects from different parts of this programme, with related projects supported under this societal challenge as well as the two Focus Areas "Sustainable Food Security" and "Blue Growth". Activities could include networking, clustering, short term visits and researchers exchanges, in order to link the respective projects, create a flow of information and foster new collaborations, towards faster advances of research and innovation in this societal challenge and Focus areas.

Expected impact: Integrating EU research projects relevant to food security, sustainable agriculture, marine and maritime research and the bioeconomy, across the research and innovation chain; Strengthening communication and interactions among these projects, with the aim to increase impacts on sustainable food security and on blue growth; Helping results developed in some projects to be taken up in other projects, and towards market applications; Networking between researchers, policy makers, industry, and end-users; Disseminating results to other researchers, industry, end users, policy makers and citizens.

Instrument: CSA

Year: 2014

Topic SC2.5.4: Networking of Bioeconomy relevant ERA-NETs

Specific challenge: More than 30 ERA-NETs have been set-up in FP6 and FP7 on a wide range of scientific subjects and disciplines relevant to the Bioeconomy. While focusing on different scientific areas, they all work towards achieving a common goal of the transnational networking and coordination of national research programmes and address a number of horizontal issues, such as the mapping of existing research potential and foresight activities, the launching of joint calls and addressing the challenges of IPR rules and bioethical concerns.

Scope: The topic aims to build on the results expected by the PLATFORM network of Bioeconomy relevant ERA-NETs with the aim to further expand the network and strengthen the initiatives undertaken for mutual learning, maximising synergies and increased coordination. The activities of PLATFORM should be continued under Horizon 2020 in close liaison with Joint Programming Initiatives (JPI) and Strategic & Collaborative Working Groups of SCAR, thus helping rationalising on limited resources for maximum impact.

Expected impact: The network of Bioeconomy relevant ERA-NETs shall then achieve a more effective and harmonised environment for the ERA-NETs, thus contributing to the European Research Area in the Bioeconomy.

Instrument: CSA

Year: 2014

Topic SC2.5.5: ERA-NET on sustainable and resilient agriculture for food and non-food systems in the bio-economy

Specific challenge: Agriculture is an integral part of the European economy and society. It is subject to multiple pressures from external drivers, which include rising food, feed, fuel and fiber demand, globalisation and environmental changes and is constrained by planetary boundaries such as land and water limits. Transitions in farming systems needs to be integrated into the broader perspective of a bioeconomy to overcome current barriers in bioeconomy supply networks and sustainably produce bio-energy and bio-materials while maintaining food production and increasing soil/biomass carbon stocks through the development of innovative knowledge intensive farming systems and land management at landscape to regional scales. Such systems aim to close cycles in order to achieve a sustainable bioeconomy and to combine food, feed, bioenergy and biobased products, recycling organic wastes, residues from agricultural production and producing and processing bioresources for industries. At the same time, the resilience of regional agrifood systems in Europe, in particular to climate variability and food price volatility needs to be increased.

Scope: The ERA-NET will pool the necessary financial resources from the participating national (or regional) research programmes and the EU, to launch joint international calls for research, development and innovation in the area of sustainable and resilient agriculture (food and non-food systems) in the bioeconomy (SRAB). The resilience of regional agricultural systems in Europe, in particular to climate variability and to price volatility (prices of energy, agricultural inputs and agricultural commodities) needs to be increased taking into account both food and non-food uses and the integration of production systems (use of by and co-products, recycling of wastes, etc...) within regions. Issues like GHG mitigation vs. fossil fuel substitution, indirect land use change impacts, regional agricultural systems and their resilience, including socio-economics, farmers and industry strategies deserve attention. The main objective of these ERA-NETs should be to pool the necessary financial resources from the participating national (or regional) research programmes and the EU, to launch joint international calls for research, development and innovation in SRAB. 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 calls to be published under the proposed ERANET should aim at tackling the identified specific challenge and should be defined in consultation with the European Commission. The selection of thematic areas and call topics should reflect experiences from other related ERA-NETs and complement the topics of the Horizon 2020 work programme. Proposals should show that calls to be published under proposed ERANET will include activities with a strong innovation and market drive, supporting the discovery of solutions which can be quickly applied. The ERA-NETs should seek synergies with other relevant European and international research and innovation

initiatives (e.g. PPP "BRIDGE") affecting sustainability and resilience of agriculture and food systems, in particular FACCE Joint Programming Initiative.

Additional information: The Commission considers that projects requesting a contribution from the EU of between €4m and €6m would allow this specific challenge to be addressed appropriately.

Expected impact: The ERA-NET will enhance operational coordination of RTD public funding in Europe by preparing and implementing transnational joint calls. In doing so, it will (i) improve coordination and reduce overlapping between national and EU funding in relevant fields of research; (ii) achieve critical mass and ensure better use of limited resources in fields of mutual interests; (iii) share good practices in implementing research programmes; (iv) promote transnational collaborations and new knowledge generation and innovation; (v) mobilise SMEs, when appropriate, in the transnational projects to enhance innovation. It may also (i) complete mapping, carried out by FACCE JPI of on-going research activities; (ii) establish a network of research activities carried out at national and regional level, including a mutual opening of national and regional research programmes.

Instrument: ERANET

Year: 2014

Topic SC2.5.6: Public-Public Partnerships in the bioeconomy

Specific challenge: Agriculture is an integral part of the European economy and society. It is subject to multiple pressures from external drivers, which include rising food, feed, fuel and fiber demand, globalisation and environmental changes and is constrained by planetary boundaries such as land and water limits. With the expected increase in global human population, in demand of animal food products and increased competition for natural resources, agriculture production will increasingly need to improve its efficiency while strengthening its sustainability by addressing societal concerns like safety and quality of food and water, animal welfare, environmental concerns, like greenhouse emissions, biodiversity, reduction of losses and waste. Transitions in farming systems need to be integrated into the broader perspective of a bioeconomy to overcome current barriers in bioeconomy supply chains. Efforts to address these challenges need to have appropriate scale and the fragmentation of European public research in these fields need to be overcome to reach a critical mass. These ERA-NETs should support the integration of the knowledge basis and innovation capacity as a tool to tackle great societal challenges in Europe's agriculture.

Scope: The ERA-NET projects could cover any of the following areas:

- Public-private partnerships in rural development initiatives, with a view to promote viable innovations in European regions; to ensure cohesion of rural areas and prevent economic and social marginalisation, foster diversification of economic activities (including service sector), ensure appropriate relations between rural and urban areas.
- Monitoring and mitigation of agricultural GHG (MMAGG), including areas like reducing uncertainties and improving national agricultural GHG inventories (with ICOS), the role of climatic variability and agricultural practices for GHG emissions, the technical and economic potential of CH₄ and N₂O mitigation, carbon sequestration and reduced emissions from energy use and pre-chain inputs,

- emissions/removals certification, economic and policy measures, including trade, barriers to implementation, life cycle assessment.
- Sustainable crop production (SCP), including areas like breeding, nutrients cycle and soil-plant-atmosphere interactions, plant health and protection, and added value of the products.
 - Sustainable livestock production, including animal health and welfare, but also in areas like breeding, nutrition and production systems.

The main objective of these ERA-NETs should be to pool the necessary financial resources from the participating national (or regional) research programmes and the EU, to launch joint international calls for research, development and innovation in the above areas. 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 calls to be published under the proposed ERANET should aim at tackling the identified specific challenge and should be defined in consultation with the European Commission. The selection of thematic areas and call topics should reflect experiences from other related ERA-NETs and complement the topics of the Horizon 2020 work programme.

Proposals should show that calls to be published under proposed ERANET will include activities with a strong innovation and market drive, supporting the discovery of solutions which can be quickly applied. 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 FACCE Joint Programming Initiative. International cooperation with related programmes from third countries partners should be considered.

Additional information: The Commission considers that projects requesting a contribution from the EU of an average of €5m would allow this specific challenge to be addressed appropriately.

Expected impact: The ERA-NETs will enhance operational coordination of RTD public funding in Europe by preparing and implementing transnational joint calls in relevant thematic areas. In doing so it will: (i) improve coordination and reduce overlapping between national and EU funding in relevant fields of research; (ii) achieve critical mass and ensure better use of limited resources in fields of mutual interests; (iii) share good practices in implementing research programmes; (iv) promote transnational collaborations and new knowledge generation and innovation; (v) mobilise SMEs, when appropriate, in the transnational projects to enhance innovation. It may also (i) provide mapping of on-going research activities; (ii) establish a network of research activities carried out at national and regional level, including a mutual opening of national and regional research programmes.

Instrument: ERANET

Year: 2015

IV. Contributions from SC2 to other Focus Areas

Focus Area "Waste"

Topic W.1: Ensuring sustainable use of agricultural waste and by-products

Specific challenge: Plant production in agriculture generates by-products and waste streams that need to be properly taken care of both for environmental and profitability reasons. This is a very diverse area which includes fruit and vegetables, wine by-products, grass, straw, etc. Fruit and vegetables are the most perishable agricultural products. Losses take place at the farm and post-harvest level and also down the chain at the level of the retail sector.

In livestock production, manure and effluents management is a challenge, in particular in industrial production systems. While manure is used as fertiliser, it impacts on the environment, with emissions to the air; soil and water. It is important to consider the whole manure chain to avoid pollution swapping. Manure and effluents also raise health issues, due to possible transmission of human or animal pathogens, and can be detrimental to animal welfare (e.g. ammonia emissions). HORIZON 2020 intends to facilitate the progress towards a zero discharge objective in agriculture production. Current main approaches for disposal consist in biodegradation (e.g. spreading on fields, biogas production) or destruction, which are not satisfactory from both an environmental and economic point of view. In the case of wine, with the last reform under the CAP, support to distillation has been suppressed, which may endanger the economic activity of distilleries and necessitates the investigation of other potential uses of by-products. Straw is a crop by-product which needs to be paid attention as it has received high interest in the last years as biomass feedstock. Yet, there appears to be a knowledge gap across the whole range of concerned actors, from farmers to processors and to policy makers on the sustainable levels of incorporation into and extraction of straw from the soil relative to its economic use for non-conventional purposes. Beyond reduction and recycling of these agricultural waste and by-products, there may be opportunities for new processes enabling innovative uses of these materials for agriculture or other purposes.

Scope: In general, activities should include the evaluation of existing techniques (biological treatment, distillation, production of biogas, etc.) and the development of new and innovative approaches for efficient use of these materials. The research should contribute to the establishment of sustainable value chains for relevant industries (e.g. manure processing, feeding industry, farmer groups), to facilitate a substantial level of cooperation and uptake of possible results. Research efforts should include case studies and should be evenly distributed between crop waste and by-products, on one hand, and manure and effluents on the other hand. On the former, investigations should be carried out on a sub-sectoral basis, including at least wine by-products and major horticultural products. On straw and other crop residues (including in mixture with manure), the research should contribute to the establishment of sustainable supply chains of surplus straw by developing environmental safeguards such as sustainable extraction rates, by developing guidance on straw and its optimal use as a soil improver in order to ensure the protection of soils and adequate levels of organic matter, by developing guidance and knowledge on farming practices to harvest and handle straw for alternative purposes.

As regards manure and effluents, the research should focus on some or all of the following areas:

- Nutrient recovery from manure, in line with zero discharge objectives
- Improve knowledge on environmental impact of manure, further developing measurements and GMP good manufacturing practices, minimising impact on water and air quality (emissions and odours)
- Sanitary implications of pathogens that can be transmitted from manure. Possible control options could be also considered.
- Management chains, from processing to transport and application.

Involvement of industry is expected and pilot and/or demonstration activities should be implemented. Knowledge platforms will be established, involving relevant stakeholders, which will identify gaps and foster dissemination of approaches and uptake of results. Actions proposed are considered to fall under the concept of "multi-actor approaches"¹².

Expected impact: The development of new uses of agricultural waste streams from the plant and livestock sectors will contribute to improve the competitiveness of the concerned sectors and will reduce potential harm to the environment. Regarding straw and other crop residues, the research is expected to produce concrete guidance on the "real" surplus of crop residues, the level that has to be incorporated back into the soil and the sustainable levels that are left for other purposes, thereby ensuring that the use of surplus crop residues as feedstock by the industry takes place with proper account of sustainability conditions. Recapturing N and P from manures will both increase resource use and restrict pollution and eutrophication of ground waters. It could also contribute to create an added value for sub-products, and respect the zero discharge objective. A decrease in emissions will contribute to make livestock production more environmentally sustainable and socially acceptable.

Actions proposed are considered to fall under the concept of "multi-actor approaches" (see glossary)

Year: 2015

Instrument: CP – R&D project

Topic W.2: A systems approach for the reduction, recycling and re-use of food waste

Specific challenge: Food waste has taken on disquieting proportions in all steps of the food production and supply chain but especially at consumer level. Before defining measures to reduce food waste at all stages it is necessary to develop a better understanding of business and consumer behaviour in relation to waste generation, handling, re-use and by-product valorisation. Technologies for the collection, sorting/grading, stabilisation and valorisation of food waste, by-products and packaging material need improvement or development. Emphasis is on optimising the performance of the whole food system, including packaging, in order to arrive at a secure and sustainable food supply. To promote and to accelerate change in the business and consumer environment the use of ICT solutions will be investigated.

Scope: Proposals should both address approaches to reduce food waste and packaging materials generated at relevant stages of the food system and investigate ways to convert food waste into high quality, value-added by-products. This research topic will develop a

¹² See glossary

comprehensive methodology for evaluating food waste in all its components hereby addressing quality, safety, sustainability and costs. Research activities will consider shelf-life assessments and labelling legislation. Inter-disciplinary research methods will include practical, close-to-market approaches for characterising the new foods and feeds and identifying the risks and benefits related to the new production processes. A database/inventory will be developed of valuable molecules, substances and materials originating from waste and by-products. Alternative food products, including those which can be used for social innovation will be identified, tested and promoted. The use of ICT solutions based on modern principles of data collection and reuse is expected to promote and accelerate change in the business and consumer environment. Risk analysis will be performed identifying hazards and their management. Partnership with industry is encouraged in particular regarding the uptake of results by SMEs, and civil society organisations are expected to be key players of any consortium. Topic focus is on the situation in Europe, but international cooperation with any third country is encouraged.

Expected impact: Research will contribute to achieving the European policy target of reducing food waste by 50% by 2030. Innovative applications of food waste that will increase the competitiveness of the European food and drink industry, in particular SMEs, are expected from this project. It will enhance cooperation between scientific disciplines and stakeholders and promote industry-academy cooperation in several areas of interest including those related to the food industry like cosmetics, packaging material and the chemical industries.

Instrument: CP – R&D Project

Year: 2014

Topic W.3: Converting biodegradable wastes into high added value products in biorefineries applying a cascading approach

Specific challenge: Preventing and managing biodegradable wastes (“biowaste” - ranging from agricultural/forestry residues, food processing wastes, sewage sludge to construction wood) is one of the main objectives of the Waste Framework Directive (WFD) and the Landfill Directive. The disposal of these wastes is expensive, generates greenhouse gas (GHG) emissions and often also represents a hazard. At the same time, biorefineries are looking to biowastes as a source of sustainable feedstock that will allow them to develop their activities in Europe without endangering food security and the environment, or contributing to ILUC. Indeed, biowastes can replace fossil resources in the production of high added value products, such as specialty chemicals and plastics.

Scope: The conversion should take place in biorefineries and involve a cascading approach. The cascading approach is in line with the waste hierarchy. It implies that the biowaste is used for the highest added value application (e.g. bio-based products over incineration for energy) and that by-products/waste streams from the production processes are again used as a raw material for other purposes. The project should make use of life cycle assessments (LCAs).

Expected impact: The project(s) will make biowastes more accessible for bio-based industries, leading to a win-win situation where taxpayers’ money is saved, economic revenue is generated and climate change is mitigated. The application of a cascading approach will ensure that biowaste as a resource is used in the most cost-effective and efficient way. The project will thus contribute to the objectives of the WFD and Landfill

Directive, as well as to those of the Roadmap for a Resource Efficient Europe, the European Bioeconomy Strategy and the updated Industry Policy.

Instrument: CP – CTM (tbc in complementarity with PPP work programme)

Year: 2015

[**Note:** Given the wide range of wastes that are biodegradable, the final topic will focus on a sub-section of these wastes that will have been determined to complement other topics under the waste focus area]

Focus Area "Personalising Health and Care"

Topic PHC.1: Paving the way for substantiation of health effects of foods

Specific challenge: Introducing food products with scientifically substantiated health effects on the European market is very resource-intensive and requires high-quality scientific research. This makes it difficult to acquire health claim approval under the EU Regulation on Nutrition and Health Claims, which in turn challenges the competitiveness and innovation potential of the European food industry. Existing intervention studies and datasets are often not comparable due to differences in study design, but an internationally standardised framework for human intervention studies on food and health is lacking. Numerous bioactive compounds have the potential of providing beneficial health effects. Biomarkers serve as surrogate for clinical or disease endpoints in studies to determine whether bioactive compounds have an effect on human health. Rapid validation methods for these biomarkers are urgently needed to facilitate the substantiation of new health claims on foods. A harmonised framework for human intervention trials and more validated biomarkers are required to pave the way for new health claims and product innovations.

Scope: A European, and where possible globally applicable, harmonized roadmap for harmonisation of human intervention studies on food and health will be created, taking also account of the gender and ethical dimension. Innovation in biomarker development, including new rapid and effective validation methods, is required. New rapid and effective validation methods for biomarkers need to be developed. The actions should establish the health effects of bioactive compounds and validate the related biomarkers. Cooperation with the JPI "A Healthy Diet for a Healthy Life" should be envisaged. Participation of relevant partners from third countries, such as AU, NZ, CA, and/or US is encouraged to add to the scientific/ technological excellence and to ensure uptake of on-going international efforts in this area.

Expected impact: A harmonised intervention study framework will contribute to standard-setting and aid sharing and re-using of nutrition data, which is resource- and cost-efficient and increases the power of the studies and the strength of their conclusions. This research will lead to more validated biomarkers and support the submission of health claims dossiers on the European market. This in return will assure food producers and stimulate them to increase their investment in research and development. The competitiveness, innovation potential and employment rate of the European food industry, including SMEs, will be increased. Participation of third countries should facilitate the global harmonisation of regulatory processes related to scientific

substantiation of health claims. The activity supports the coordination of the development of European Research Area as regards the JPI “A Healthy Diet for a Healthy Life”.

Instrument: CP – R&D Project

Year: 2014

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V. Other actions not implemented through calls for proposals

Title: Evaluations of proposals

Description:

Implementation information: Experts contracts for the evaluations of proposals

Indicative budget:

Year: 2014 and 2015

Title: Monitoring of

Description:

Implementation information: Experts contracts for the monitoring of XX

Indicative budget:

Year: 2014 and 2015

Title: Inducement prize on the Bioeconomy

Description: tbc with RTD.C

Implementation information: Prize

Indicative budget:

Year: 2015

Title: Group of independent experts for policy relevant analyses and forward looking reflection on Bioeconomy related research

Description- A group of independent experts will be established to provide a better understanding into existing and new trends which are of importance for the development of the European Bioeconomy. In this respect, in the framework of the Monitoring and Signalling Mechanism (MSM) established in support of the SCAR foresight process, an ad hoc foresight expert group formed by high-level independent experts will be contracted by the Commission, with the task to build on the 3 previous SCAR foresight rounds as well as recent exercises (i.e. JRC Foresight Global Food Security ending in June 2014) and deliver new insight about possible changes of importance for the development of the European Bioeconomy. The study will be conducted in close cooperation with relevant activities within on-going initiatives (i.e. SWG on Sustainable Bioresources, SWG on Forestry) and future foresights conducted by the Bioeconomy Observatory).

Indicative budget: EUR 200 000?

Instrument: Coordination and Support Action – expert-reviewer/evaluator appointment letter

Topics to review with JRC

Topic JRC.SFS.1: Diagnostic and detection methods for Animal and Plant Health

Specific challenge: The detection and quantification of plant pests and other microorganisms of concern for plant health and animal health, including zoonotic agents in a fast and reliable way is a critical component in the monitoring and control of their introduction or spread. These tools are essential to avoid or reduce related economic costs, trade disruptions or human health risks. These methods are used not only by Competent Authorities (e.g. quarantine pest control, food safety control, health certification), but also by 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 widely (i.e. beyond research laboratories), by both authorities and operators, additional work often needs to be performed to further test the methods, fully validate them and where appropriate compare them methods to reference methods. In some cases further harmonisation, including standardisation is needed and reference materials need to be developed.

Another challenge is to assess how far generic diagnostic/detection methods can be adapted to broaden their use.

Scope: The project aims at harmonising and validating existing protocols for the detection and quantification of plant pests and other micro-organisms of concern for Animal and Plant Health. Both areas should be adequately addressed. A good justification on the choice of protocols to be validated should be given. Research is built on existing results, but where necessary further development of the promising protocols can be pursued. 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. Results have to be disseminated to national, European and international policy makers. Involvement of industry is expected.

Expected impact: This research is in support of Animal and Plant Health Policies. It should provide validated protocols for the detection of quarantine pests to be used primarily by Competent Authorities (e.g. National Plant Protection Officers), EU Reference Laboratories or National Reference Laboratories, but also by business operators. In the case that these protocols can be used for detection of non-quarantine organisms, dissemination towards the appropriate end-users should be sought.

Instrument: CP –CTM

Year: 2015

Topic JRC.SFS.2: Food security in the EU

Specific challenge: An improved monitoring and risk assessment of EU food security is very timely, particularly as the deepening economic crisis and sustained high food prices weigh heavily on vulnerable households which are falling in the poverty trap. This calls for clear indicators that identify potential risks to EU food security and improved

modelling tools that enable forward looking projections and scenario analyses that contribute to risk assessment at EU, Member State and sub-regional levels, as well as households with different levels of vulnerability. There is a need to integrate quantitative socio-economic and bio-physical models to anticipate the impact of possible extreme weather events (draughts, floods, diseases) and improve understanding of the longer term implications that demographic trends, in particular immigration, ageing societies or urbanisation might have on market projections. There is a particular need to better modelling capacities for short-term forecasts and early warning systems with respect to broad product coverage and by optimising the use of existing infrastructures that would improve assessing the implications of unexpected market disturbances (weather events, food-safety issues, economic, etc.) and facilitate better and timely policy responses. This would entail a better understanding of consumer reaction to short-term shocks (e.g. economic, food scares, etc.). Finally, there is limited understanding of the role of EU fisheries and aquaculture in the context of EU food security.

Scope: Proposals shall take stock of potential risks to EU food security and draw up simple and straightforward indicators to assess the present state of EU food security and future risks. An important aspect of this topic is the research into the implications of fisheries and aquaculture on EU food security, particularly regarding feed demand and its contribution to food supply. Proposals should have as objective to establish quantitative modelling tool(s) that integrate socio-economic and bio-physical models. Proposals should be ambitious regarding the geographic, sector and structure coverage, enabling the identification of vulnerable EU regions and/or income groups in the context of forward looking scenarios.

Modelling tool(s) will have to be established that focus on short-term market projections of main commodities and can be used as an early warning system for food insecurity and risk assessment. Research should lead to an improved understanding of supply and demand drivers that would provide input into the short- and medium/long-term models.

Expected impact: Assessment of the state of EU food (in)security with special focus on the implications of the economic crisis (including financial aspects) and development of methodologies to measure EU food (in)security and simple and straightforward indicators to assess potential risks to food security at EU, Member State and local levels, as well as households with different levels of vulnerability. Quantitative modelling tools made available for Commission Services that integrate socio-economic and bio-physical models enabling the space-time series analysis of factors driving food security and their implications considering the multiple dimensions of sustainability (including identification of vulnerable EU regions and/or income groups). Improved use of existing infrastructure and quantitative modelling tools with broad and interactive product coverage for short-term market projections and impact analyses made available for Commission Services. A better understanding of the contribution of EU fisheries and aquaculture to EU food security.

Instrument: CP – R&D Project

Year: 2015

Topic JRC.SC2.1: Fostering sustainable food chains through public policies: the cases of the EU quality policy and of public sector food procurement

Specific challenge: In November 2012, the European Parliament and the Council have adopted a new Regulation on the quality schemes for agricultural products and foodstuffs. Important pillars of the EU quality policy are the PDO / PFI / TSG schemes and organic farming. They are meant to maintain a large variety of agricultural products, reflecting the diversity of EU agriculture and to allow a remunerative price to the producers. The policy is expected to play an important role especially in disadvantaged and remote territories where agriculture is a prominent economic activity. On the other hand, the European public sector is emerging as a powerful actor in the food chain notably through public procurement policies which can create new markets and foster the development of an “economy of quality”. Innovative approaches in this area are multiplying in various parts of Europe from different types of governance (communal, regional, etc.). These approaches cater for different objectives such as improving the nutritional balance of school canteens or fostering the procurement from local producers. Hence they have the potential to deliver economic, environmental and social benefits to the society. The proposed topic aims at investigating the impact of both the quality policy and public sector food procurement policies on the environmental, economic and social sustainability of rural territories and their role in fostering the provision of public goods. The research will extend to short food supply chains which are impacted by both types of public policies and assess their impact on the rural economy.

Scope: The research will investigate the contribution and impact of the quality policy to the various objectives of the agricultural and rural development policies: territories which are most dependent on agriculture, social and territorial cohesion, fostering a competitive and innovative economy, sustainable management of natural resources, animal welfare, landscape management, collective approaches to agricultural production and processing, inclusion of smallholders, consumer confidence. Costs related to the policy and possible routes to improve its delivery, efficiency and effectiveness will be researched. The activity will cover a large array of PDOs and PGIs, organic products and short food supply chains and will take stock of outcomes of previous activities in the area. On food procurement policies the research will review existing practices, identify constraints to their development and shed light on its impact on territorial development. A large review of existing schemes will allow elaborating good practices, decision tools and drawing recommendations with a view of scaling up. The project will gather relevant data on short food supply chains, which will allow the assessment of their contribution to the sustainability of agriculture and the rural economy. It will cover an appropriate number of EU Member States, associated countries, non EU OECD countries and developing countries. The participation of relevant actors (SMEs, producer organisations, advisory services, etc.) will be positively evaluated.

Expected impact: The knowledge generated will provide insights in the effects of the EU quality policy and public sector food procurement policies on sustainability. It will allow to better design and implement these policies and to foster their delivery to the overall sustainability of agriculture and the rural economy. The research will clarify how these two approaches, through the creation of new quality markets, can foster the development of local food chains.

Instrument: CP – R&D Project

Year: 2014

Topic JRC.SC2.2: Provision of public goods by EU agriculture and forestry: Putting the concept into practice

Specific challenge: Traditionally, agricultural and forestry activities in their various forms have been the provider of manifold – often underappreciated – public goods including ecosystem services. In view of the expected significant rise in demand for primary production and more intensive production methods, the supply of public goods provided by agriculture and forestry is increasingly threatened, the more since they are considered as "non-excludable", "non-rival" and therefore without market value. Although the term "public goods" is widely used, the concept lacks an operational framework and a common understanding as regards the wider societal and non-market benefits of agriculture and forestry activities taking into account dynamic changes in land use and farming systems. Thorough evidence on the nature and extent of public goods is required to identify demand as well as to create effective incentives and policy options for their continued provision.

Scope: Proposed activities will help to develop a systematic and operational framework to map and characterise the variety of public goods (potentially) provided through agricultural and forestry activities, taking into account various temporal and spatial scales, and the diversity of natural, cultural and socio-economic conditions in Europe. They will identify the link between economic activities in the primary production sectors and public goods. Furthermore, work will consider ways in which to valorise and establish effective support measures (policies, incentives) for the delivery of public goods in response to societal expectations. Information and dissemination activities will target a wide range of stakeholders and allow for their active participation.

Expected impact: Outputs and results are expected to provide a better understanding of the nature and processes that influence the delivery of public goods by different types of farming and forestry systems in Europe. The development of mechanisms and tools for measuring and valorising public goods will allow shaping policies and incentives aimed at stimulating or optimising their supply. Recommendations resulting from the proposed work will also help identifying win-win scenarios by which agriculture, forestry and society at large can benefit from the support of public goods and thereby increase sustainability of primary production.

Instrument: CP - R&D Project

Year: 2014

Topic JRC.SC2.3: Support for regionalisation of the Common Fisheries Policy

Specific challenge: The new CFP aims at a regionalised management framework that will secure sustainable ecosystem-based management of fisheries, taking a regional approach and relying on detailed decisions taken jointly by Member States under the umbrella of common principles and benchmarks set up by the EU institutions. Member States will, on a regional basis, require more direct scientific support for measures to implement fisheries policy, having regard to mixed-fisheries effects, technical interactions, fishing operations and the need to maintain biodiversity, a normal structure and abundance of food webs, and acceptable impacts on the benthic environment. The challenge is to identify bottlenecks in the development of implementation measures on a regional basis, and to help resolve the issues identified to ensure that fishing activities for sustainable harvesting of marine organisms are effectively managed either at EU,

regional or national level within an ecosystem and precautionary approaches to fisheries management.

Scope: On a regional basis, assess the biological, technical, economic, social and societal factors that stand in the way of achieving the conservation objectives of the Common Fisheries Policy. Compatibility with the Marine Strategy Framework Directive also has to be ensured. Develop and propose means to resolve or circumvent the blocking factors that have been identified. Future management approaches must take much closer account of the specificities of the regional ecosystems and of regional fisheries practices and interests in the context of an ecosystem-based approach without disregarding the likely interconnections among regions and ecosystems (Large Marine Ecosystems).

Expected impact: Improved regional implementation of the Common Fisheries Policy, by improving basic knowledge and helping to build improved social and societal acceptance of conservation measures.

Instrument: CP – R&D Project

Year: 2015

Topic JRC.SC2.4: Forecasting and anticipating effects of climate change on fisheries and aquaculture (INCO dimension)

Specific challenge: Global warming and effects of climate change will probably affect all the components of the biosphere and will have consequences on the functioning of the ecosystems and the living organisms that populate them. In the context of the forecasts for increasing human population and subsequent increased needs for sufficient and safe food supplies from land and sea, it is of critical importance to predict and anticipate the nature and magnitude of potential impacts of climate change on food production systems. The nature and characteristics of the Ocean are key in shaping the climate on Earth and a lot of scientific effort is directed towards the understanding of their role and influence on the functioning of the thermodynamic machinery of the planet, which is a prerequisite for predicting and anticipating potential consequences of climate change on seafood production methods and systems. Ensuring sufficient preparedness and quick adaptation capacity of European fisheries and aquaculture to potential threats and opportunities due to climate change might be determining for the long term sustainability of the two sectors, as well as for guaranteeing to European consumers and societies an acceptable degree of self-sufficiency of seafood supplies.

Scope: The topic will focus on understanding how changes in the marine ecosystem due to climate change may affect the most important exploited European fish stocks. It will provide new insights, at different geographic scales, on how climate-induced changes of the ecosystems may affect important biological processes (reproductive success, individual growth and in general, population dynamics, migration patterns interactions with other fish populations, etc) of the main European exploited fish stocks. Particular focus will be given on risk assessment, analysis of vulnerability, elaboration of adaptation strategies for fisheries management and development of innovative early warning methodologies to anticipate major system changes such as ecological regime shifts.

The aim of this topic will also be to investigate on the potential effects and consequences of climate change on aquaculture taking into account the diversity of aquaculture practices, geographic locations, farming technologies, as well as farmed species and their biological and environmental requirements. The topic will identify and modelise potential

threats from global warming (for example, sea level rise, temperature/salinity changes, acidification, coastal erosion, HABs, diseases spread and pathogens virulence, invasive species etc) on the main segments of the European aquaculture sector. It will assess the economic risks related to these threats and will propose realistic and cost-efficient mitigation options and tools, allowing anticipation and advance planning for regulators and economic operators.

Expected impact: Support the ecosystem approach to fisheries management and aquaculture development in order to reduce uncertainties and risk in the scientific advice, policies implementation and production planning. Allow to regulators, fisherman and aquaculture operators to anticipate, prepare and adapt to different scenarios driven by climate change, while minimizing economic losses and social consequences. Identify opportunities that might occur under the different scenarios and prepare to reap the potential benefits for the European fisheries, aquaculture and seafood sectors and consumers.

Instrument: CP – R&D Project

Year: 2015

Topic JRC.SC2.5: Bioeconomy Observatory

Specific challenge: Tbc with JRC + International Cooperation partners

Instrument: CSA

Year: 2015

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