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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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I. Focus Area Sustainable Food Security

Sub-challenge: Sustainable food production systems

Topic SFS-1: Genetic resources to sustain current and future agriculture and forestry

a) 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 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 and from the requirements set by current variety and seed legislation. There is an urgent need to preserve and use the remaining diversity of local breeds and crops as well as to support their production and contribution to regional economies.

Scope: Projects will deploy a range of measures – spanning from research to networking, demonstration and dissemination - to promote the use of local varieties and breeds along with their associated seed, farming and commercial systems. Activities shall propose 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 to bring together a wealth of knowledge and resources from the formal and informal sectors and encourage the creation of new networks (within and between regions) and interactions, e.g between conservationists, scientists, farmers, consumers and breeders.

Expected impact: Overall, project outputs shall help increasing the capacity of rural areas – in particular in marginal environments - to play an active role in the stewardship of genetic resources, strengthen specific farming systems and breeding approaches, cater for specialised markets and provide consumers with high quality products.

Additional info: Individual projects will address either plant or animal genetic resources.

Funding scheme: CP – R&D Project

Year: 2014

b) Bridging the gap between conservation and use of plant and animal genetic resources

Specific challenge: tbc

Scope: Collaborative project with cascading grant. Activities will address the current bottlenecks at the interface between germplasm conservation and its use in plant and animal breeding. Public-private partnerships in this

area will serve to make better use of the potential of valuable genetic ex-situ and in-situ resources in breeding programmes for major/minor crops and breeds.

Expected impact: tbc

Instrument: CP – R&D Project

Year: 2015

Topic SFS-2: 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.

Instrument: CP – R&D Project

Year: 2015

Topic SFS-3: Increasing efficiency of terrestrial livestock production through genetics and nutrition

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. Research activities should have a multi-actor approach. Involvement of livestock industry is expected.

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 – Combined R&D and close-to-market activities

Year: 2015

Topic SFS-4: Optimising external nutrient inputs management and use efficiency 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.

Scope: European intensive crop production systems are highly dependent on the massive use of external nutrient inputs, mainly of mineral and synthetic origin. In current farming practices, fertilisers are not generally used in an optimal way. Both misuse and overuse of these external nutrient inputs represent an economic loss

for the farmer, are among the main responsible for ground and water pollution, and contribute to the concentration of contaminants in soil, such as heavy metals and organic contaminants, especially in intensely cropped areas. Finding innovative and effective strategies to improve external nutrient management and use efficiency at farm level, including precision farming latest tools and instruments, is of paramount importance for the survival of competitive intensive crop production in Europe and for reducing its negative impacts on both the environment and on human health. Research activities should have a multi-actor approach.

Expected Impact: The reduction of external nutrient inputs in intensive cropping systems - while keeping high levels of productivity - will have manifold benefits, among them, the most tangible ones will be; 1) the improvement of European farmers' competitiveness through savings; 2) the improvement of ground and surface water quality; 3) the reduction of soil contaminants, with clear benefits on the conservation of biodiversity, on wildlife and on human health, through the reduced release of pollutants in the environment.

Instrument: CP – R&D Project

Year: 2014

Topic SFS-5: Tackling losses from animal diseases: targeted viral production 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.

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 – Combined R&D and CTM

Year: 2014

Topic SFS-6: Practical solutions for pests and diseases

Specific challenge: Directive 2009/128/EC lays down the need of application of Integrated Pest Management (IPM) practices from farmers by 2014. Furthermore, the number of available Plant Protection Products (PPPs) is decreasing. With background the changes in the legislative landscape, research for IPM solutions is needed to support sustainable agricultural production.

In particular, reduction of the number of Plant Protection Products available in the market, causes problems for the 'minor use' crops that often need a tailor made pesticide for protection. Furthermore, weeds pose a serious problem for agriculture resulting in losses and increase production costs.

Scope: Integrated Pest Management solutions should be sought for 'minor use' crops and weeds creating big losses in agriculture. In the choice of 'minor use' crops the economic value of the crop should be taken into account. The budget should be evenly distributed between research covering 'minor crops' and weeds. Research should build on and not overlap with approaches obtained by other projects. Advances in robotics, ICT should be taken into account. The centre of gravity should be R&D activities, also showing the technical feasibility through demonstration activities. Research activities should have a multi-actor approach. Involvement of the industry is expected. Significant SME involvement.

Expected impact: Research should aim at practical solutions/methodologies for farmers, growers etc., boost innovation and provide products to the market. Broad dissemination to the end-users is expected.

Instrument: CP – R&D Project

Year: 2014

Topic SFS-7: Prevention and Practical solutions to invasive species

Specific challenge: The number of invasive alien species in Europe is increasing as result of globalisation of trade and increased mobility of persons and goods. Invasive species can act as vectors of new pests and diseases, change biodiversity patterns, disrupt landscapes, etc. Furthermore, climate change is expected to favour the permanent establishment of many alien pests throughout Europe. Efforts in this area have been focused on mapping the invasive species and pests in agriculture and forestry, as well as on detection, diagnosis, and outbreak scenario analysis. However, there is now need to go beyond these data and further develop integrated mechanisms of response measures (practical solutions) for preventing and combating the 'phenomenon' and reduce its impacts.

Scope: Proposals should address threats for both the agricultural sector and forestry. A number of invasive species should be tackled. Quarantine organisms can be included in the scope of this topic. Research should address invasive species that are a real threat for Europe and are causing/will cause significant economic losses or have a large environmental impact. International cooperation with third countries experiencing the same problems is encouraged. The centre of gravity should be R&D activities, also showing the technical feasibility through demonstration activities. Research activities should have a multi-actor approach. Involvement of the industry is expected. Significant SME involvement.

Expected impact: Results should provide prevention mechanisms for the introduction of invasive species. In the case where the invasive species is established in Europe, solutions for its containment or eradication should be sought. Sustainable procedures, methodologies and products should reach the end-users.

Instrument: CP – R&D Project

Year: 2015

Topic SFS-8: Harmonisation and/or validation of diagnostic/detection methods for support of 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 Project

Year: 2015

Topic SFS-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 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 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 farming 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 a larger adoption of CA in Europe.

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: 2015

Topic SFS-10: Towards more resource-efficient food processing methods

Specific challenge: The increase of the world population, refined consumer demand and the earth's basic resources being finite request 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 the current food production systems in SMEs imperative with the aim to optimise current or to develop new or alternative processes in the light of the resource efficiency, whilst 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 of food commodities – in a competitive and innovative way, while 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 of processes in line with the ILCD¹ handbook. 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 a resource-efficient economy via a notable reduction of water and energy and an increased raw material efficiency, 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

Sub-challenge: Safe food and healthy diets

Topic SFS-11: 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

¹ International Reference Life Cycle Data System; <http://lct.jrc.ec.europa.eu/pdf-directory/>

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. 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-12: Improving the control of infectious epidemics and foodborne outbreaks through rapid identification of pathogens

Specific challenge: The health of animal and human populations worldwide is confronted with the threat of existing, new or emerging infectious epidemics spreading faster and appearing more frequently than ever before. Meanwhile, modern demographic, environmental, technological and societal conditions favour the spread of these epidemics, at a global scale. Besides being a major threat to human populations, infectious epidemics to both animals and humans can turn into a severe burden on health 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. 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.

Scope: Sequenced-based methods for characterisation of pathogens should be applied. An information system based on the 'One Health' approach should be developed. This system should annotate sequence-based data with clinical, microbiological, epidemiological and other data required for risk assessment (RA). It should also monitor pathogens, including rapid comparison and identification and include predictive models on 'high-risk' areas, emergence patterns and RA. Harmonised standards for sample preparation, analysis, data collection, data management and data sharing should be developed and the interoperability between information systems (public health data, clinical data, food safety data, etc.) should be guaranteed. Based on the information system, research should identify the drivers of spread of epidemics, analyse their synergism and their impact, use these findings to build predictive models on RA, and provide improved evidence and management tools for authorities, businesses and citizens.

Expected impact: Global standards for faster identification of pathogens and better and more integrated surveillance tools for infectious epidemics 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.

Form of funding: CP – R&D – Single or two-stage; Budget from Dir. F and Dir. E

Instrument: CP – R&D Project

Proposed year: 2014

Topic SFS-13: Novel 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 and feed 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 feed and food sources. Finally, consumer acceptance needs to be considered, and particular emphasis needs to be placed on dissemination, communication and exploitation activities. The project 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, it will introduce into the market innovative food or feed products that are based on the new high-quality protein. The involvement of participants from International Cooperation (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 – Combined R&D and close-to-market activities

Year: 2014

Topic SFS-14: 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, 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), and environmental impact (e.g. transport) remain 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, with a specific focus on 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 cooking oils and fats, the 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. 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

Sub-challenge: Global drivers of food security

Topic SFS-15: Food security in the EU: current state, future drivers and improved modelling capacity for forward looking projections and scenario analyses

Specific challenge: Improving the understanding of the state of food security in the EU 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 does not only call for addressing the lack of clear indicators to identify potential risks to EU food security, but entails the need for improved modelling capacities 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 strong need to build quantitative modelling tools that integrate socio-economic and bio-physical models and enable a better 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 improve modelling capacities for short-term forecasts and early warning systems with respect to broad product coverage and by optimising the use of existing infrastructure. This would enable an improved assessment of the

implications of unexpected market disturbances (drought, food-safety issues, economic, etc.) and facilitate better and timely policy response. 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 that enable the assessment of 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 on the one hand and its contribution to food supply on the other.

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, as specified in the challenge, which 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 SFS-16: 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. Food prices have been subject to major oscillations, triggered by extreme weather patterns, fluctuations in energy prices, and rising demand from emerging economies. As the cost of agricultural commodities represents only a part of the price of food products (besides other inputs, labour, capital, transport, etc.), the specific impact of increases and volatility of agricultural commodity prices on higher food prices and inflation is not fully understood. In parallel, organic, local and non-processed food chains have emerged as an alternative to the traditional industry-retailer food chain, and the effect of their co-existence on the behaviour of stakeholders is not well understood. The economic crisis, the rise of biofuels, global and European demographic developments and their effect on consumption patterns, and the threat of climate change contribute further to this rising uncertainty. All these factors seem to generate significant adjustments in consumer choice and diet quality – especially for vulnerable groups (hidden hunger) – as well as unsustainable food consumption patterns. Many questions remain on how agricultural commodity (and food) price instability, the co-existence of different food systems, and the global socio-economic context influence food choices.

Scope: Proposals should address the behaviour of the different stakeholders in the food chain. Emphasis should be put on consumers, opportunities for new or improved services and solutions, and price transmission throughout the food chain. 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 and their socio-economic drivers. Attention needs to be given to sustainable and healthy diets for all, hidden hunger, the gender dimension, and the quantification of consumer responses through reliable data and socio-economic models. The activities should cover the main existing and emerging food systems and representative strata of the European population 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 functionality 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, 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 by vulnerable groups. The knowledge generated improves the potential for service and social innovation and of business models for SMEs, which will contribute to an improved competitiveness of the supply chain. Another impact will be on policy initiatives related to the Common Agricultural Policy. Furthermore, data will contribute to new pricing and

marketing strategies for all players along the food chain, resulting in growth and diversification opportunities for the EU food sector.

Instrument: CP – R&D Project

Proposed year: 2015

Topic SFS-17: 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, 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 across its various dimensions and taking into account the different aspects of sustainability. 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 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-18: Towards global sustainable food governance

Specific challenge: Food security has been identified globally as the greatest challenge faced by human society. Globalisation has created opportunities for economic development as well as risks. Although it is commonly accepted that globalisation reduces inequalities between regions, one observes that it may lead to greater inequalities within regions causing concerns for increased prospects of social instability. As to food production and supply systems, globalisation means increased chances for food export, possibilities to set up joint ventures with non-European partners, potential for sustainably sourcing food supplies overseas, but also higher risks for over-exploitation and degradation of natural and basic resources, food safety threats, income disparities among the actors of the food chain, recurrent price shocks and even food insecurity. Consequently the challenge for the European food research community in partnership building with non-European food experts is to tackle the main issues concerned with the globalisation of food production and supply chains while addressing mutually beneficial opportunities for long term sustainable and equitable economic growth. In view of the complexity of food security and the urgency to move towards sustainable food consumption patterns research will look at the interplay of the Union's policies bearing upon its relationship with Europe's partner regions to arrive at the state of genuinely sustainable food systems.

Scope: Research will develop and test an analytical framework encompassing the impacts of different factors of change on food security. It will then focus on the type of knowledge, policies and innovation needed for a performing food system capable to feed the world population in a sustainable, equitable and healthy way by means of an agro-food system which is diverse, ecologically-sound, resilient and which builds the skills necessary for future generations. This will be done with respect for people's right to food sovereignty, while also looking at the impact of trade, and especially standards, on poverty and food wastage. 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 the current deficiency 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 a single conceptual framework, the total food system from consumers to ecosystems while addressing all involved, either individually and/or in their interactions. This innovative approach has the capacity to identify policy responses to address the currently dysfunctional food system – characterised by co-existence of malnourished and overweight people – due to a better understanding of the interdependence of production, trade and stocks, dependency on external inputs and need for incentives to create a food system that is resilient, equitable, healthy and sustainable. Research draws attention to the direction in which social and technological innovation has to be channelled in order to arrive at the desired innovation in food consumption patterns, business models and legal frameworks. This topic will contribute to the EU commitment regarding the Millennium Development Goals (MDGs).

Instrument: CP – R&D Project

Year: 2014

Topic SFS-19: Market replication of innovative solutions for sustainable food security

Specific challenge: Market failures and barriers sometimes hinder promising research and innovation results from finding applications in the market. Ensuring a Sustainable Food Security requires a better market replication of innovative solutions.

Scope: innovative solutions should have already been demonstrated, but never applied in the market.

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

Instrument: CP – CTM Project

Year: 2015

II. Focus Area Blue Growth

Disclaimer (to be included in the draft WP)

Like other Focus Areas, the Focus area "Blue Growth" requires particular coordination among services and inputs from different pillars and parts of the Horizon 2020. Therefore, the text included in this document in relation to the planned activities of the Blue Growth Focus Area is a "work in progress", under review by the members of the Interservice group established for the Focus Area. This version is the draft proposed by RTD.E before the ISG meeting of 4 June 2013, and includes not only topics proposed by RTD.E but also by other services.

Sub-challenge: Sustainably exploiting the diversity of marine life

Large scale initiative on marine biotechnologies – 2015

Topic BG-1: Bio-discovery of novel marine-derived biomolecules (E2)

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 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 impact: 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 Project

Year: 2015

Topic BG-2: Marine industrial Biomaterials with new and improved functionalities (E2)

Specific challenge: The main driver for bringing biopolymers to the markets is their potential as a base for innovative biomaterials with improved or completely new functionalities. The growing market for biopolymers is evidenced by the increasing number of applications, ranging from biodegradable plastics, food additives to pharmaceutical and medical polymers. Currently, industry is devoting great attention to marine-derived biopolymers. They are indeed considered as of particular interest in view to deliver new materials with novel properties able to meet identified functional needs and circumvent existing barriers.

Scope: Proposals should be industry driven, clearly aiming to enhance competitiveness and market innovation potential of marine-derived biopolymers. Proposers should examine one or several of the wide variety of biopolymer applications. The research should include in its approach the whole value chain from the feedstock, to the potential final product. Activities should span, from the sampling and isolation of marine organism, to the chemical and enzymatic modification, production in suitable biological systems and improvement of mechanical and functional properties. Technoeconomic viability of the proposed approach, supply of raw material as well as any relevant Access and Benefit Sharing aspect should be duly considered.

Expected impacts: Results from this research should enhance the competitiveness and the innovation potential of the marine biotechnology industry and boost the emergence of marine biopolymers as novel competitive commercial products. It should contribute to the successful implementation of the Marine strategy framework directive, the EU integrated Maritime Policy and related Blue Growth initiative as well as to contribute to realising the objectives of the Lead Market initiative on bio-based products.

Instrument: CP – R&D Project

Year: 2014

Topic BG-3: Enhancing the industrial exploitation potential of Marine-derived enzymes (E2)

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

Topic BG-4: Marine biodiversity for better valuing marine life (to be moved in 1?) (I3)

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 ecotourism, 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 Strategy², Convention on Biological Diversity (CBD), Rio+20).

Instrument: CP – R&D Project – two stage [possibility of including clustering activities with the biodiversity topic on 'status & trends']

Year: 2015

Topic BG-5: Integrated bio refineries for multi products from algae (large scale initiative 2016 !)

Specific challenge: The use of micro-algae to develop a range of value-added products (food, cosmetics, as well as third-generation biofuels) represents a major inter-disciplinary scientific and technological challenge, with strong potential economic impact. Long term success depends on the ability to address in an integrated way a series of scientific and technological bottlenecks

Scope: Research and Innovation activities will aim to tackle key technological bottlenecks such as selection of best species, improved energy balance and cost-efficiency of the process, effluent treatment and development along the way of a number of value-added products such as feed, food, cosmetics. Research will also aim at bringing all actors of the innovation chain (research institutes, technology providers, end users) around a few identified infrastructures. Some EU projects are addressing partially this topic but a larger scale integrated research, over a longer period of time is needed to address in an integrated way the scientific and technological bottlenecks and bring solutions closer to market. The proposal is to launch a structured large scale pilot/demonstration initiative of approximately 5-years duration with one or more sites offering the best conditions, to mobilise with industrial partners, energy specialists, and marine biologist the equipment needed and address in an integrated way, close to real conditions, the identified challenges.

² COM(2011) 244 final

Expected impacts, - Results of such an initiative should deliver a robust scientific and technological basis for substantiating strategic decisions for the industrial development of algae for high added-value products. The integrated production of biofuels and other bulk products such as food and feed proteins and fertilisers together with the targeted high value added products can increase the cost competitiveness of the bio-refinery concept. The projects will as well strengthen the competitiveness of the European marine biotechnology industry and by reducing technical bottlenecks in this area making the whole sector more attractive to investment by the biotechnology industry.

Instrument: CP – CTM Project (large-scale demonstration / pilot projects)

Year: 2016

Sub-challenge: Offshore

Preparatory action – CSA (2014)

Topic BG-6: Preparing for the future offshore economy (H2, K3)

Specific challenge - Human based activities of 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 technological advances that are opening up access to deeper and further sea spaces. One new and innovative way 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. A number of EU funded research projects have looked at such options for multi-use offshore platforms³. They also look to some extent the socioeconomic impact of such models, but they do it from the perspective of specific business models (e.g. using renewable marine energy to produce Hydrogen or support offshore aquaculture, or develop leisure activities...). There is a need to analyse the outcomes of these projects as well as other business models for offshore activities, with a view to 1) identify potential economic scenarios i.e. business models for the development of the future offshore economy, 2) technological bottlenecks to be addressed and 3) the socioeconomic impacts of different options for addressing them, including in terms of marine spatial planning.

Scope: The project will analyse and identify the socioeconomic developments most likely to happen in the new maritime economy and the most plausible corresponding business models. Multi use offshore platforms do not exist yet but are currently being developed. Research based on existing production facilities should help to provide a realistic picture of the challenges that future multi-use offshore platforms must be equipped to handle. Therefore, the project will review the existing multi-use offshore platforms and business models, as well as others that haven't been researched (such as offshore ports – transshipment, or offshore processing of fish).

The project 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.

Expected impacts: Results should help to identify the technological conditions and bottlenecks (e.g. offshore platforms or specialised vessels, remotely operated underwater vehicles, control systems, fluid and solid transport, in-situ energy production and use) to be overcome to make identified business models operational at large scale across various marine environments. Possible improvements to the policy framework and organisation at European level of key maritime (industrial and scientific) stakeholders interested should also be considered. In the longer term, this preparatory action should pave the way for a large scale demonstration and pilot project.

Instrument: CSA

Year: 2014

Topic BG-7: Delivering the Sub-sea technologies for new services at sea (H2)

Specific challenge: Oceans used to be a passage way, to carry goods or people from port to port. Only for fishing it was a place to harvest a valuable resource. This is progressively changing, as shown by the oil & gas community who has started for a while the exploitation of oilfields at sea. The cost of energy, combined to the scarcity of resources and the difficulty to manage on land the impact on the environment are now pushing towards more and more activity at sea beyond fishing and oil and gas extraction: harvesting marine renewable energy, producing fresh water, fish farming and algae growing, seabed mining, etc. The Marine technologies and Engineering which needs to be developed to enable these new markets, and therefore create jobs and growth can be sorted in three groups: the ship of the future (clean, safe and thrifty, therefore smart), the seaborne or surface activities (multi-use offshore platforms, etc.), and the subsea activities.

Scope: It is proposed to address feasibility studies and definition studies (including demonstrators) of the main components required to work undersea.

The main challenges are the “deep, cold, far and big” boundaries, with ultra deep water (down to 6,000m), arctic regions, long subsea tie backs, extended seabed installations, etc.

In addition, it is expected to face new technology challenges like corrosive products, heavy / viscous liquids, high pressure - high temperature systems, etc. as well as the control of the potential impact on the environment

³ H2-Ocean, TROPOS and MERMAID in FP7-OCEAN-2011

of these activities.

The areas of interest are the following:

Subsea Construction systems: ROV and Diving

- *Specialised "Robots" and AUVs, deployment, recovery and docking systems*
- *Subsea "factory" Machineries.*

Expected impacts:

- ✓ Support to the Blue Growth agenda and the new maritime / offshore economy;
- ✓ Safety of the new / offshore maritime economy;
- ✓ Support to scientific underwater / deep sea observation;

Instrument: CP – R&D Project (large-scale demonstration / pilot projects)

Year: 2014

Sub-challenge: Seabed mining

Preparatory action – CSA (2014)

Topic BG-8: Seabed mining – preparing next steps (H2, 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: The project 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).

It 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? It 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. The project 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 impacts: Results of this project should help to define and create the conditions for a the development of a large scale structured initiative on seabed mining. In particular, it will seek to 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 technological, societal, environmental challenges to be addressed for the exploitation of those mineral resources. The development a shared research agenda to answer key questions on the economic feasibility and environmental acceptability of seabed mining should also be considered

Instrument: CSA

Year: 2014

Sub-challenge: Ocean observation technologies/systems

Topic BG-9: Developing in-situ Atlantic Ocean Observations for a better management and exploitation of the maritime resources (I3, E2)

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 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 IAOOS 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 IAOOS including required spatial and temporal coverage, interoperability, the new ocean observation technologies and the full range of chemical and biological sensors,. The research and innovation necessary to underpin the full and open discovery and access to the ocean observations and facilitating the 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 Project

Year: 2014

International dimension: transatlantic initiative

Topic BG-10: Acoustic and imaging technologies (H2)

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 Project

Year: 2014

International dimension: transatlantic initiative

Sub-challenge: Socio-economic dimension - Engagement with the society

Topic BG-11: Ocean literacy

Specific challenge: There are two major reasons to support interactions between marine scientists, maritime industries and societal stakeholders.

Firstly, 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. Secondly, 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 CLAMER⁴) 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.

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 Project

Year: 2014 and 2015

International dimension: Transatlantic initiative (Literacy)

Topic BG-12: Monitoring and dissemination activities

⁴ Climate Change and European Marine Ecosystem Research – FP7 - www.clamer.eu

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 Project

Year: 2016

International dimension: Transatlantic initiative

Other actions proposed (to be agreed)

PROPOSED by DG RTD/E

Topic BG-13: Market replication of innovative solutions for blue growth

Specific challenge: 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.

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

Instrument: CP – CTM Project

Year: 2014

Topic BG-14: Supporting SMEs efforts for the development and deployment 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.

Scope: 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: Making SMEs developing innovative solutions contributing to Blue Growth.

Instrument: SME Instrument

Year: 2014

PROPOSED by DG RTD/H2 under offshore challenge

Topic BG-15: Building with nature – smart and sustainable dredging

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, a paradigm shift from “Building in Nature” to “Building with Nature” is necessary to ensure a sustainable future. The “Building with Nature” concept responds to the need of aligning the interests of economic development and care for the environment: working with the natural system in such a way that society’s infrastructural needs and the interests of stakeholders are met, while new opportunities are created for nature. In other words, “Building with Nature” aims to be proactive, utilizing natural processes and providing opportunities for nature as part of the hydraulic infrastructure development process.

While some work has been done to develop the concept⁵, there is a need to push it further by studying how it could be applied in different maritime basins, with their different economic, geophysical and ecological conditions.

Scope: A cornerstone of the “Building with Nature” approach involves detailed analyses of physical, ecological and social systems. It will therefore require a multidisciplinary team and approach.

The project will review all 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. It will develop general principles and 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 impacts: Increased sustainability and climate resilience of hydraulic infrastructures and dredging works.

Improved global competitiveness for 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

Year: tbc

Duration: 3-4 years.

Topic BG-16: Response capacity to oil spills and marine pollution

(to be further elaborated – Trans-Atlantic dimension?)

PROPOSED by DG RTD/I

Topic BG17: Strengthening international cooperation in the field of marine sciences

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.

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. 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 countries (e.g. US and Canada) 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 Area⁶ and the Atlantic Ocean Cooperation Research Alliance⁷.

Instrument: CSA

Year: 2014

⁵ Particularly in the Netherlands with the "ECOSHAPE" project: <http://www.ecoshape.nl/>

⁶ COM(2011) 782 final

⁷ COM (2013) XXX final

Topic BG-18: European polar research cooperation

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 of existing monitoring programmes 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. Enhanced respect of the EU's international commitments with respect to the Arctic Council, the Montreal protocol, and UNFCCC and others related to polar sciences.

Proposed instrument: CSA

Year: 2014

Topic BG-19: Improving the preservation and sustainable exploitation of Atlantic marine ecosystems

Specific-Challenge: The North Atlantic is a key marine region, regulating climate as well as being globally important for key ecologically and biologically significant areas (e.g. deep cold-water corals). The biodiversity and functioning of this fragile environment as well as the products and services they provide are 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 and biological features of the Atlantic for global climate and its provision of ecological services there is a need to improve our capacity to model and understand the future dynamics of Atlantic ecosystems. Knowledge gaps should be filled in order to deepen our understanding of the biogeographic patterns, biodiversity and ecosystem services supported by different marine ecosystems at ocean basin 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 and 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 preserving the environment.

Expected impact: Implementation of international agreements to conserve Vulnerable Marine Ecosystems⁸ and Ecologically or Biologically Sensitive Areas⁹. 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 Directive (MSFD), the EU 'Maritime Strategy for the Atlantic Ocean Area'¹⁰ and the Atlantic Ocean Cooperation Research Alliance¹¹.

Proposed instrument: CP – R&D project – 2 stages

Year: 2014

⁸ UN Resolution 61/105

⁹ Convention on Biological Diversity

¹⁰ COM(2011) 782 final

¹¹ COM(2013) XXX final

Topic BG-20: Further consolidating the ERA in marine sciences

Specific challenge: Addressing the oceans and seas issues is a complex endeavour. On the one hand they are an ecological treasure to be preserved and on the other hand they represent a very important economic element to be exploited. A better understanding of the nature and conditions of the seas will result in a better and more sustainable exploitation of them, and it is here where research arises as an element of the utmost importance. However the large number of research funding agencies and the extension of coastal areas in Europe make necessary the engagement of resources in a single direction among all the European sea basins and the strengthening of common strategies. 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 inter-operable.

Scope: This action should target: the consolidation of existing marine research funding networks and other key players around the ERA objectives mentioned above. It should define ways of implementing pan-European and regional strategic marine research agendas including research infrastructures roadmap developed under previous initiatives (e.g. SEAS-era, JPI Oceans) in areas with high European added value and innovation potential. 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: Enhanced global impact of EU funded research in the field of Marine sciences 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.

Instrument: CSA/ERA-NET (tbc) – Single stage

Year: 2015

III. Societal Challenge 2 – Main Call

2.1 Sustainable Agriculture and Forestry

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

Topic SC2-1: 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.

Scope: Proposed activities will further elucidate the effects of land use on farm soils, 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

2.1.2 Providing ecosystem services and public goods

Topic SC2-2: Provision of public goods by EU agriculture: Concept and evidence base

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. 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. 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 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 trade-offs 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 for measuring and valorising public goods will allow designing and shaping policies and incentives aimed at stimulating or optimising their supply. Recommendations resulting from the proposed work will help to identify win-win scenarios by which actors within agriculture and forestry can benefit from the support of public goods and thereby increase sustainability of primary production.

Instrument: CP - R&D Project

Year: 2014

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

Topic SC2-3: The crucial role of knowledge exchange in research and innovation: Thematic Networks

A. Thematic network on closing the research and innovation divide in rural areas

Specific challenge:

Specific challenge: Research and innovation play a key role to support the capacity of the various agricultural sectors to be competitive and sustainable. Yet, in agriculture and in rural areas there is no concerted approach to close the research and innovation divide, i.e. to better exploit results of research and to enhance innovation-driven research. The specific challenge therefore consists in lifting this constraint by bringing relevant actors (innovation centres, innovation brokers, etc.) working on this theme to take stock of existing best innovation practices and science-based methodologies on innovation brokering and networking and to optimise resource use to plan research targeted to solutions and opportunities and to facilitate innovation, notably through knowledge exchange.

Scope: Activities will facilitate the exchange of existing knowledge on innovative approaches in agriculture and in rural areas, incentives for better exploiting existing research, for capturing and promoting grassroots-level innovation and methods for co-generation of innovation driven research. They will include the mapping of innovation actors' activities, methods and networks, the establishment of accessible in the duration of end-user material on the theme, research and innovation agendas and action plans for implementation of innovative approaches at various geographic scales and relevant information to the European Innovation Partnership (EIP) "Agricultural Productivity and Sustainability" network. Activities will identify type of methods and practices to be used for researchers-practitioners and science-policy interfaces and analyse the use of interactive and system innovation approaches for knowledge exchange between different research and policy areas. Appropriate attention to the potential role of the ICT and to incentivising researchers will be given. The proposals will involve the main innovation actors (brokers, funders, networks, etc.).

Expected impact: Closing of the research and innovation divide in agriculture and rural areas; higher levels of implementation and dissemination of innovation methods and approaches facilitating the competitiveness and the overall sustainability of agriculture and rural areas in a holistic approach; better targeted research agendas and incentives for multi-actor approaches in innovation-driven research; more focused knowledge exchange and education on innovation approaches.

B. Thematic networks in specific agricultural sectors or themes

Specific challenge: Research and innovation play a key role to support the capacity of agriculture to be competitive and sustainable. Yet, in many sectors or thematic areas there is no concerted knowledge approach at national and/or EU level of the various players, which constrains impact. The proposed topic aims at lifting this constraint by bringing all relevant actors of the concerned sectors / thematic areas to take stock of existing scientific knowledge and best practices and optimise resource use to plan and execute research and facilitate innovation, notably through knowledge exchange.

Scope: Activities will revolve around facilitating the exchange of innovative knowledge on relevant areas in the concerned sector. They will include the mapping of research and innovation activities and results, the establishment of accessible and long-term available end-user material on the theme, contributions of overview of research outputs and best practices and other relevant information to the European Innovation Partnership (EIP) "Agricultural Productivity and Sustainability" network. The proposals should involve the diversity of actors in the concerned sectors or thematic area (farmers organisations, technical institutes, research stations, research institutes and universities, advisers, SMEs, rural development operational groups on the theme, etc. as relevant).

Expected impact: Higher levels of implementation and dissemination of existing knowledge and innovations facilitating the competitiveness and the overall sustainability; better structured, relevant and resource efficient research in the concerned sectors / thematic areas at national and EU level thanks to better targeted research agendas on multi-actor approaches; more focused knowledge exchange and education on the concerned themes. Several networks will be supported, of which one will cover low-input farming in WP 2014.

Instrument: CSA

Year: 2014 (A and B) and 2015 (B)

Topic SC2-4: 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 SC2-5: Understanding key issues impacting European agriculture

Specific challenge: The farming sector operates within a challenging economic, financial and environmental framework as well as a diverse policy environment which together condition its sustainability and competitiveness. This broad framework has gone through substantial changes over the last decades, driven by changing consumer needs, urbanisation and globalisation, increasing influence of financial and energy markets, differences in the pace of concentration along the supply chain, as well as growing pressure on natural resources and climate change. Relevant policy changes have either followed or preceded these developments, with an increasingly apparent characteristic that non-agricultural policies have a growing impact on agriculture. The following dimensions in particular have gained prominence over the last two decades and require thorough investigation: 1) agricultural standards which define product characteristic and / or their related production methods; 2) financial markets play an increasing role in the agricultural economy in particular through their potential role in commodity price formation and in their potential impact on farmers' access to credit; 3) unfair practices along the food chain, characterised by a lack of market transparency, inequalities in bargaining power and anti-competitive practices that lead to market distortions in the food chain ; 4) the individual farmer is the target of an increasing flexibility of the policy framework generated by an increasing range of options within the CAP and other EU or national policies.

Scope: The research will cover the above dimensions. On agricultural standards an extensive review and comparison will be undertaken for the EU and some of the most important third countries and their impacts on cost and competitiveness or on access to markets will be assessed. In a global context where an increasing number of trade agreements are being concluded by major partners, the issue of standards, in particular differences in requirements, is indeed becoming a major issue. As regards financial markets, two dimensions will have to be investigated. Firstly, their impact on price formation of major commodities and the conditions for access of the farmers (including small farmers) and the options which are available to manage risk besides futures. Secondly, the conditions of farmers' access to credit, especially young farmers, in a context of increased economic uncertainty and continuously increasing capital intensity of agricultural production. Regarding unfair practices in the food chain, the research will aim at developing a methodology to measure their effects on the working of the whole chain, including their impact on value added for the different actors, on innovation, product choice as well as other effects on consumers. Regarding the variable geometry policy requirements the aim will be to carry out a territorial mapping of the web of policy requirement combining EU, national and regional policies applicable to farmers and to develop tools to assess the implications on the competitiveness and sustainability of farming across the EU.

Expected impact: Research results will increase significantly the understanding of the role of key elements of the economic and policy environment which frame the farming activity. This will provide the necessary insights to derive recommendations for policy makers and to improve the design of the various policies involved, beyond the Common Agricultural Policy, with the objective to improve both the sustainability and competitiveness of the sector. Quantification of the unfair practices is expected to provide insights as to the best approaches to

eliminate them, including the potential role of ICT to increase market transparency.

Instrument: CP - R&D Project

Year: 2015

Topic SC2-6: 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, 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. Proposals which will involve the research community and the relevant actors of the livestock supply chain, in particular actors from the farming sector, and the society at large, in a multi-actor approach, will be positively evaluated. 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.

Instrument: CP - R&D Project

Year: 2014

Topic SC2-7: Unlocking the growth potential of rural areas through social innovation

Specific challenge: Rural areas share many of the same sustainability (economic, environmental and social) challenges. However, the key challenge is how rural places can tackle these sustainability challenges by taking advantage of their own territorial capital and how their resources can be enriched and capacities enforced to favour smart, sustainable and inclusive growth. As a response, innovative place-based development approaches (social innovation per se) are emerging, which through collaborative means at a specific geographical scale address complex socio-economic and environmental challenges in the field of rural regional development, agriculture, water and land use, etc. However, there is limited empirical evidence of the outcomes and benefits of these social innovations and on the conditions that would make them work better. 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 participate and results in new skills and practices as well as in new attitudes, values and behaviour. There is a knowledge gap as to how to support the development of the most vulnerable regions where the social structure is most fragile as a result of outmigration, economic decline and social marginalisation, leading to difficulties in these regions in setting up partnerships and cooperation, such as Leader local action groups in the EU context. This also raises the challenge of promoting institutional capacity building at the local and regional levels and to develop social capital in the most vulnerable rural areas.

Scope: Research shall identify social innovation dynamics agriculture and rural development and how it may be supported and steered in such a way that it produces a sustainable agro-food systems and vital rural societies, especially in the marginal rural areas where social innovation is the most needed. Sustainable development potential of different social learning arrangements will be evaluated, and the conditions for their further development will be identified. Attention needs to be given on innovative governance mechanisms of emerging innovative approaches and their potential implications for social innovation dynamics. Research will also investigate how different policy instruments (e.g. LEADER, local policies) support social innovation and how their delivery can be further enhanced; the role of diverse public and private entities in enabling social innovation as well as in constraining it. In order to embrace diversity and specificities of European rural territories proposals should cover different types of rural areas in various Member States. Furthermore, participation by non-European partners (preferably EU partner countries around the Mediterranean region) is encouraged.

Expected impact: By shedding light on social innovation pathways in agro-food systems and rural territories and on how processes of social innovation may be supported and steered in such a way that it produce a sustainable agro-food systems that allows for revitalisation of rural societies the research is expected to foster the transition towards sustainable agricultural and rural development, ergo smart, inclusive and sustainable growth of rural areas. Improved territorial governance by understanding of 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 places (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.

Instrument: CP - R&D Project

Year: 2015

2.1.4 Sustainable forestry

Topic SC2-8: 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 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. This is currently challenged at the EU level by the multitude 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, including national forest inventories and monitoring of sustainable forest management, able to feed into forest-related international processes and information systems that heavily relies 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 make innovative use of both space-applications and field-elevated data. 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.

Expected Impact: Research outcomes are expected to create the prerequisites for an increased harmonization of forest inventories and monitoring of management measures. 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 SC2-9: 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 climatic 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

ERA building

Topic SC2-10: ERA-NET on Rural development and innovation

Instrument: ERANET

Year: 2014

Topic SC2-11: ERA-NET on Agricultural GHG: monitoring and mitigation

Instrument: ERANET

Year: 2014

Topic SC2-12: ERA-NET on sustainable crop production

Specific Challenge: Agriculture is an integral part of the European economy and society. In terms of indirect effects, any significant cut back in European farming activity would in turn generate losses in GDP and jobs in linked economic sectors – notably within the agri-food supply chain, which relies on the EU primary agricultural sector for high quality, competitive and reliable raw material inputs, as well as in non-food sectors. Agriculture and forestry play a key role in producing public goods, notably environmental such as landscapes, farmland biodiversity, climate stability. At the same time, many farming practices have the potential to put pressure on the environment, leading to soil depletion, water shortages and pollution, and loss of wildlife habitats and biodiversity.

The cropping systems will increasingly need to improve their efficiency while strengthening their sustainability by addressing societal concerns like safety and quality of food and water, as other environmental concerns, like biodiversity, greenhouse emissions and the reduction of losses and waste. European public research in these fields is still fragmented and it is therefore needed to strengthen co-operation and coordination of research activities carried out at regional or national level.

Scope: The ERA-NET will aim at mapping research activities and establishing joint research efforts between the involved countries, in 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. The main objective of this ERA-NET is to support the integration of the knowledge basis and innovation capacity in SCP as a tool to tackle great societal challenges in Europe's agriculture. This should provide a solid basis for policy decisions. This ERA-NET will also 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 SCS. Thematic focusing of these calls should be commensurate with the funds available, so as to ensure a reasonable rate of success in the call. Details on the topics covered by the calls will be decided by the participants in due time but should be selected upon consultation with the Commission services concerned. The selection of thematic areas and call topics should reflect experiences from ERA-CAPS, EUPHRESKO II and XXX [IPM ERANET selected under KBBE.2013.1.4-02] and the relevant Technology Platforms and complement the topics of the Horizon 2020 work programme.

Research will be innovative and integrated, addressing SCS in broad intersectoral and interdisciplinary ways. The ERA-NET will seek synergies with other relevant European research and innovation initiatives affecting cropping systems, in particular FACCE Joint Programming Initiative.

Expected impact: The ERA-NET will enhance operational coordination of RTD public funding in Europe by preparing and implementing transnational joint calls in relevant thematic areas. In addition it will: (i) provide mapping of on-going research activities, (ii) Improve coordination and reduce overlapping between national and EU funding in relevant fields of research; (iii) achieve critical mass and ensure better use of limited resources in fields of mutual interests; (iv) share good practices in implementing research programmes; (v) promote transnational collaborations and new knowledge generation and innovation; and (vi) mobilise SMEs in the transnational projects to enhance innovation; (vii) 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

Topic SC2-13: Coordination action in support of the implementation by participating States of a Joint Programming Initiative on Agriculture, Food Security and Climate Change

Specific challenge: Following the implementation of the actions foreseen by the Commission's Communication on Joint Programming to tackle Europe's major societal challenges, the Competitiveness Council has welcomed the progress made by EU Member States in Joint Programming Initiatives launched so far and especially in the FACCE Joint Programming Initiative tackling the combined challenges of food security against the continuous threats from climate change, global population increase, and food and non-food demand.

Scope: The topic aims to build on the results expected by the coordination action in support to the FACCE JPI in updating the Strategic Research Agenda and supporting the Implementation Plan. Moreover, the coordination action should further strengthen the international dimension of the JPI to be addressed by ensuring coherence with other relevant international initiatives.

Expected impact: In coordination with the SCAR Committee and relevant Bioeconomy ERA-NETs, the FACCE JPI should help streamline the national programmes in order to reduce overlaps and to exploit synergies, with a scale and scope of action that will go well beyond what either the EU or Member States can achieve on their own.

Instrument: CSA

Year: 2014

Topic SC2-14: 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 SC2-15: ERA-NET on sustainable livestock production

Specific Challenge: The livestock sector contributes largely to the agricultural outputs and European economy; it supports rural communities and contributes to food security. With the expected increase in global human population, in demand of animal food products and increased competition for natural resources, livestock production will increasingly need to improve its efficiency while strengthening its sustainability by addressing societal concerns like animal welfare and safety and quality of food, and environmental concerns, like greenhouse emissions and the reduction of losses and waste.

European public research in these fields is still fragmented and it is therefore needed to strengthen co-operation and coordination of research activities carried out at regional or national level, beyond what is done through the ANIHWA ERANET focussed on animal health and animal welfare.

Scope: The ERA-NET will aim at mapping research activities and establishing joint research efforts between the involved countries, in animal health and welfare, but also in areas like breeding, nutrition and production systems. The main objective of this ERA-NET is to support the integration of the knowledge basis and innovation capacity in sustainable livestock production (SLP) as a tool to tackle great societal challenges in Europe's agriculture. This should provide a solid basis for policy decisions. This ERA-NET will also 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 SLP. Thematic focusing of these calls should be commensurate with the funds available, so as to ensure a reasonable rate of success in the call. Details on the topics covered by the calls will be decided by the participants in due time but should be selected upon consultation with the Commission services concerned. The selection of thematic areas and call topics should reflect experiences from ANIHWA and the relevant Technology Platforms and complement the topics of the Horizon 2020 work programme.

Research will be innovative and integrated, addressing SLP in broad intersectoral and interdisciplinary ways. The ERA-NET will seek synergies with other relevant European research and innovation initiatives affecting livestock production, in particular FACCE Joint Programming Initiative.

Expected impact: The ERA-NET will enhance operational coordination of RTD public funding in Europe by implementing transnational joint calls in relevant thematic areas. In addition it will: (i) provide mapping of ongoing research activities; (ii) Improve coordination and reduce overlapping between national and EU funding in relevant fields of research; (iii) achieve critical mass and ensure better use of limited resources in fields of mutual interests; (iv) share good practices in implementing research programmes; (v) promote transnational collaborations and new knowledge generation and innovation; and vi) mobilise SMEs in the transnational projects to enhance innovation; vii) 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

Topic SC2-16: ERA-NET on Sustainable and resilient agriculture and food systems in the bio-economy

Instrument: ERANET

Year: 2015

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

2.2.1. Informed consumer choices

Topic SC2-17: 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 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 behavioral 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

Proposed year: 2014

2.2.2. Healthy and safe foods and diets for all

Topic SC2-18: 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, and the development of relevant new food products. 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 SC2-19: Assessing health risks of combined human exposure to toxic substances from foods and drinking water

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 will be reviewed in order to arrive at a harmonized approach. Research will 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 developed will help to 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

(all relevant topics are in the focus area "Sustainable Food Security" and "Waste")

2.2.4. Cross-cutting actions covering the whole activity

Topic SC2-20: A Strategic EU-China Food Research Agenda

Specific challenge: In the current multi-polar world Europe has considerable opportunities to benefit from partnership building with emerging economies. With regard to food, the European food industry, including equipment manufacturers, could enhance its export potential as well as set up economic joint-ventures and at the same time broaden the choice of safe and diverse food to the European citizen.

Scope: The main objectives of this topic are to lay down the basis for future ST&I programme cooperation at bi-regional, EU-China, level on cross-cutting, inter-disciplinary food issues that represents societal challenges (food safety; food security; sustainable consumption behaviour and choice editing; food processing; food chain management; food waste and especially food waste management in urban areas; governance, ethics and sovereignty; nutrition; quality and trade) of common interest and subsequently its implementation. This undertaking will determine a medium term, strategic research agenda of mutual benefit with a detailed implementation plan of research priorities that shows reciprocity in financial responsibility, scientific leadership, academy-industry-government interaction. The next step, the implementation of the strategic research agenda, will be carried out via publication of competitive calls for cascading grants in accordance with the Horizon2020 and Chinese Rules for Participation.

Expected impact: Strategic alliance building based on mutual benefit between two major scientific and economic powerhouses; stepped up and sustained EU-China scientific cooperation on food based on a clear strategic research agenda with implementation plan allowing progress on harmonization of food standards and food safety policies; strengthening of competitiveness for food producing SME through opportunities for economic joint ventures; strengthening Europe's place in the globalisation of science by making progress towards a G-3 in research (China, US, EU); advancement on the international dimension of Horizon 2020 and the ETP 'Food for Life'.

Instrument: CP – R&D Project with cascading grants

Proposed year: 2014

2.3 Unlocking the potential of aquatic living resources

2.3.1 Developing sustainable and environmentally-friendly European fisheries

2.3.2 Developing competitive and environmentally-friendly European aquaculture

In 2014, a large initiative on aquatic farmed animal health is foreseen in the field of aquaculture. In addition to that, emphasis will be put on implementing our strategy for international cooperation by launching a platform for dialogue between EU and Latin America, as well as by building and expanding beyond the conclusions of the KBBE forum WG on farmed molluscs diseases. In the field of fisheries, a large initiative is foreseen aiming at supporting major policy developments stemming from the recent revision of the CFP, related in particular to the reduction of the discards in European fisheries.

In 2015, three large initiatives are foreseen, focused on forecasting impacts of climate change on fisheries and aquaculture sectors, on supporting the implementation of the MFS and revised CFP (including a smaller initiative of governance in fisheries), as well as on the economic and market dimensions of fisheries and aquaculture.

NB: Other relevant topics can be found in the focus area Blue Growth.

Topic SC2-21: 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/documented 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 second aspect of the topic will consider only pathogens that have a demonstrated/documented 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 SC2-22: 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 SC2-23: 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 SC2-24: 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. 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 SC2-25: New governance framework for European fisheries management: from centralization to regionalization and from the latter to self-regulation

Specific challenge: The EU waters are now too large, widespread and diverse for one size fit all-solution. Detailed management carried out by a single, central management body (the EU institutions) would inevitably lead to a rigid micro-management that in the past has proven to be ineffective, costly and over-complex. The new CFP aims at a regionalised management framework that will secure sustainable ecosystem-based management of fisheries, taking a sea basin 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. Precise governance paradigms must be developed to ensure that fish stocks are effectively managed either at EU, regional or national level.

Scope: New fisheries management under 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. Hence, research on this area should focus on delivering indicators for monitoring good governance on fisheries. Focus will be on the development of indicator frameworks, tools, criteria and monitoring systems allowing to closely follow-up the performance of both existing and future management approaches. Interactions with other maritime sectors will have to be also considered within a broader integrated ecosystem-based management approach.

Expected impacts: Support for policy development aiming at a comprehensive ecosystem-based approach to fisheries management for the eco-regions, optimizing economic and social benefits, and identifying new governance opportunities suitable to be implemented within an innovative regional strategy.

Instrument: CP – R&D Project

Year: 2015

Topic SC2-26: Ensuring economic sustainability and competitiveness of European fisheries and aquaculture sectors to reap the potential of seafood markets (INCO dimension)

Specific challenge: 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

2.3.3 Boosting marine innovation through biotechnology

(Three) topics under Blue Growth Focus Area

2.4. Sustainable and competitive bio-based industries

2.4.1 Fostering the bioeconomy for bio-based industries

Topic SC2-27: Supporting biorefineries development through the broadening and optimisation of available biomass crops

Specific challenge: Plant lignocellulosic biomass is the most abundantly available renewable material on the planet and is crucial as a source input for integrated biorefineries. However, most crops used as sources of lignocellulosic biomass with potential use in integrated biorefineries are poorly characterised and relatively undomesticated feedstock crop candidates. The challenge here is to optimise the production of biomass crops especially under marginal environment conditions, improving at the same time biomass composition, thus adding value and broadening potential industrial use.

Scope: Research should focus on the optimisation of biomass crops production, especially for novel, undomesticated or/and neglected species, for their use in integrated biorefineries. Research is needed in order

to exploit large genetic variation of biomass crops and to improve their tolerance to marginal environments. The research will integrate modern genetics, biochemistry and agronomy needed to fully exploit the potential of biomass crops for industrial (e.g. fibres, composites, value-added chemicals) to increase profitability beyond the high-volume, low-value bioenergy uses.

Expected impact: Broadening feedstock sources for production of lignocellulosic biomass to help realise a profitable and sustainable integrated biorefinery. Improvements in production (yield) 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.

Instrument: CP – R&D Project

Year: tbc

Topic SC2-28: Expanding the range of bioactive natural compounds available for industrial application

Specific challenge: Natural products from plants that can be used for industrial applications (e.g. pharmaceutical, cosmetic, agrochemical, and fine chemistry) are increasingly reaching our markets. However, it is estimated that only 10% of all terrestrial plants have been characterised biochemically, and even less so for these specific purposes. In addition, many of the compounds of interest are produced in very small amounts, and frequently by endangered and / or slow growing species. Also, some compounds may only be produced upon interaction with other organisms, such as fungi, microorganisms or other plants, or under abiotic stress.

Scope: Full value chain from bioprospecting to product development is necessary to comprehensively characterise and exploit the genetic and biochemical diversity in order to identify natural bioactive compounds. A particular focus should be on plant-derived molecules, used to develop new bioproducts. The research will improve biodiscovery, production in suitable biological systems and purification of the target molecules. 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.

Funding level: 100%

Instrument: CP – R&D Project

Year: tbc

Topic SC2-29: Optimising the use of oil feedstocks as a source of bio-based products

Specific challenge: Development of dedicated industrial oil crops is considered highly relevant for the bioeconomy, yet efforts are complicated by various factors. The first challenge is to move beyond model species to develop oil crops with high yield. The second challenge is to adapt plant oil characteristics to industrial needs. Finally, oil crops should be adapted to environmentally sustainable cultivation on marginal land, in order to minimise competition with food production.

Scope: Research should encompass full use of biomass of oil feedstocks, for bio-based products such as bioplastics, lubricants, or added value fine chemicals extracted from oil crops in a cascade approach to ensure efficient use of residual biomass. The research should address development of oil production in vegetative tissues (e.g. leaves), with sufficient quantity, quality and homogeneity. It will address bottlenecks such as extraction and purification of specific bio-based products derived from oil feedstocks. The relevant environmental and regulatory issues should be fully taken into account.

Expected impact: 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.

Instrument: CP – R&D Project

Year: tbc

Topic SC2-30: Green factory: Innovative molecular farming approaches for high added value molecules

Specific challenge: Plants, including higher plants, mosses and algae, have a proven track record as scalable expression platforms ("green factory") for production of recombinant high-value proteins, such as safe, pathogen-free biopharmaceuticals – e.g. vaccines, monoclonal antibodies – or industrial enzymes. However, their development lags behind microbial systems. Major challenges hampering economic feasibility are ensuring high protein expression yield as well as authenticity of the heterologous protein, and thus, its high efficacy.

Scope: The research should focus on bottlenecks such as optimization of gene expression, use of proper cell lines, and maximizing efficiency of downstream product purification. Research can encompass also issues related to protein stability and degradation and/or improvements of bioreactor design, and culture parameters. Furthermore, the authenticity challenge should be addressed.

Expected impact: 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.

Instrument: CP – R&D Project

Year: tbc

2.4.2 Developing integrated biorefineries

Topic SC2-31: Increasing Biomass availability through optimised supply logistics for biorefineries

Specific challenge: Many renewable biological resources are currently underutilised or wasted, some of which can even represent a hazard if not properly disposed of. Research and innovation developing a reliable and economically viable logistic for the collection of these resources and new technologies for their pre-treatment could make them available as a feedstock for advanced biorefineries.

Scope: Particular emphasis should be given on using these resources in a smart way, e.g. through a cascading approach, to produce a wide range of bio-based products (e.g. chemicals, plastics etc.). This can improve the competitiveness of existing industries and create new sources of revenue and jobs.

Expected impact: Promoting advanced biorefineries will generate new sources of revenue and jobs. Furthermore, the substitution of petrol by renewable biological resources in industrial production processes can significantly contribute to reducing the EU's dependency on fossil resources and to mitigating climate change.

Instrument: CSA

Year: tbc

Topic SC2-32: 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 in what is known as third generation biorefineries. This biorefinery model is particularly attractive for regions where the biomass availability is less plentiful, as it is the case in Europe. Several routes that involve the conversion of CO2 into valuable chemicals (e.g. methanol, carbonates, organic acids, etc) should be explored, such as (photo)-chemical/catalytic processes, biochemical-enzymatic 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 project

Year: tbc

2.4.3 Supporting market development for bio-based products and processes

Topic SC2-33: 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 in this area 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 biobased products market segment.

Instrument: CSA

Year: tbc

2.4.4 Cross-cutting actions covering the whole activity

Topic SC2-34: 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 SC2-35: 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 bulk of relevant scientific and technological knowledge produced as a result of bottom-up research under Horizon 2020 *Excellent Science* (ERC, Marie Curie, FET), 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, such as ERC/Marie Curie/FET/Research Infrastructures, with related projects supported under this societal challenge as well as the two Focus Areas "Sustainable Food Security" and "Blue Growth". Similar activities could be foreseen to link also with relevant projects from the *Industrial Leadership* part of Horizon 2020. 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 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 SC2-36: Bioeconomy Observatory

Specific challenge: Tbc with JRC + International Cooperation partners

Instrument: CSA

Year: 2015

Topic SC2-37: Inducement prize on the Bioeconomy

Specific challenge: Tbc with RTD.C

Instrument: Inducement prize

Year: 2015

Topic SC2-38: Joint Programme for International Cooperation on the Bioeconomy

Specific challenge: Tbc with RTD.D and International Cooperation partners

Instrument: European Joint Programme

Year: 2015

IV. Contributions to other Focus Areas

Focus Area "Waste"

Topic W-1(a): Ensuring sustainable use of crop waste and by-products

PROPOSED TO BE MERGED WITH W2 (manure)

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. Current main approaches for disposal consist in biodegradation (e.g. spreading on fields) 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.

Scope: Activities will include the evaluation of existing techniques (biological treatment, distillation, production of biogas, etc.) and the development of new approaches. Relevant knowledge platforms will be established which will foster dissemination of approaches and case studies and identify gaps. Investigations will be carried out on a sub-sectoral basis, including at least wine by-products, major fruits. On straw and other crop residues (including in mixture with manure), the research will 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. The involvement of the various categories of concerned actors in the activities (producers, processors, advisers, researchers, as relevant) will be positively evaluated.

Expected impact: The development of new uses of waste streams from the plant sector 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.

Instrument: CP - R&D Project

Year: 2015

Topic W2: W1(b) Manure

PROPOSED TO BE MERGED WITH W1

Specific challenge: Manure and effluent control is one of the challenges faced by the livestock production sector. The challenge is multi-faceted:

Zero Discharge: HORIZON 2020 intends to facilitate the progress towards a zero discharge objective in agriculture production. This will require substantial progress on manure and effluents management.

Environment: Manure impacts on the environment, with emissions to the air; soil and water. Additionally, odours have also a significant impact on society. Changes in manure management aimed to reduce the emission of a particular gas may result in higher emissions of other gases. It is therefore important to consider greenhouse gas emissions through the whole manure chain to avoid pollution swapping. Reducing nitrogen contents of manure by optimising animal nutrition is an effective way to reduce nitrogen losses from storage.

Animal and public health: Manure-effluent emissions also involve animal and public health aspects, due to possible transmission of pathogens. Ammonia emissions can be also detrimental to animal welfare conditions and public health.

These implications are particularly relevant in intensive production systems.

Scope: Given the scope of needs; the topic allows a measure of flexibility from participants: The research should focus on some of the proposed areas:

- Improved knowledge of nutrient recovery from manure, in line with zero discharge objectives
- Improving environmental performance by reducing odours and emissions (ammonia and greenhouse emissions). Minimise effluents impact on water and air quality. This would have a positive impact in reduction of greenhouse gases and could make intensive livestock production more respectful of societal concerns
- Improve knowledge on environmental impact of manure, further developing measurements and GMP good manufacturing practices
- More knowledge on sanitary implications of pathogens (virus & bacteria) that can be transmitted from manure. Possible control options could be also considered.

- Improved knowledge on manure management chains, from processing to transport and application. This could include the development of cost-effective decontamination protocols.

To ensure that knowledge and innovation are shared across Europe, a pan-European, multi-disciplinary, cross-sectoral approach is required. Proposals should include significant involvement of relevant industries (e.g. manure processing, feeding industry, farmer groups), to facilitate a substantial level of cooperation and uptake of possible results. A focus on intensive production systems would be desirable.

Expected impact: 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 subproducts, and respect the zero discharge objective. A decrease in emissions will contribute to make livestock production more environmentally sustainable and socially acceptable. A decrease in the animal and public health risks posed by manure-effluents.

Instrument: CP - R&D Project

Year: 2014

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. Topic focus is on the situation in Europe but international cooperation with any third country is encouraged. 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 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. Risk analysis will be performed identifying hazards and their management. Partnership with industry is encouraged in particular regarding the uptake of results by SMEs.

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. 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. It will provide sound scientific substantiation for developing new functional foods and support the European policy on health and nutrition claims. 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: Towards a gradual elimination of discards in European fisheries

(also possibly implemented in Focus Area SFS or SC2)

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 without necessarily introducing further fishing pressure, 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, 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. The economic and social dimensions of the above-mentioned problems shall be paid particular attention. The topic will address in particular innovative technologies and practices to reduce/avoid discards, new methodologies to treat discards including sorting, stocking, preserving, processing on-board vessels or from large aquaculture facilities. It will also develop ways to utilise and obtain a market value for species that are normally discarded (due to low commercial value, small size fish, poor conservation) through 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. The topic will also examine the possible use of these species to produce products of high added value,

etc. Finally, it 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 (cascading grant)

Year: 2014

Topic W-4: 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.

Scope: Biodegradable wastes can replace fossil resources in the production of high added value products, such as specialty chemicals and plastics. 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.

Funding level: 100%

Instrument: Cooperative project

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 (*possibly general SC2 Call*)

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, 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. Proposals should unravel the mechanisms of action of bioactive compounds on health 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 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