

Inputs from the French delegation for the SC2Work Programme 2018-2020

February 2nd, 2017

This document is a preliminary input from the French delegation on some topics that could be considered by the EC for the next Work Programme for 2018-2020. It is divided into 7 parts that address two or more strategic orientations of the scoping paper.

Microbiomes

Addressing:

2.1 Addressing climate change and resilience on land and at sea

2.3 Functional ecosystems, sustainable food systems, healthy lifestyles.

2.4 Boosting major innovations on land and sea – new products, value chains and markets

A better understanding of microbiomes could lead to major and fast innovation : decreasing agricultural effects on climate change and environment while increasing production

New strategies for the optimization of biomass production

Topic titles proposed:

- **The impact of agronomical practices on plant microbiomes and their role in the quality, typicity and safety of final products**
- Sustainable biomass production via the optimization of plant nutrient utilisation by new strategies
- Beneficial rhizosphere microbes as a new sustainable means to enhance crop productivity and stress tolerance

Microbiomes in the context of One Health approche

Topic titles proposed:

- The microbiome from an integrated one-health perspective
- Integrative control of microbial communities for sustainable production and human health

Modeling and knowledge

Topic titles proposed:

- Multi-scale modelling of microbial ecosystems

Plant production improvements (including under a context of climate change)

Addressing :

2.2 Making the transition towards a circular bioeconomy

2.3 Functional ecosystems, sustainable food systems, healthy lifestyles.

2.4 Boosting major innovations on land and sea – new products, value chains and markets

Genetic approaches

Topic titles proposed:

- **Studying epigenetics to select resilient crops in the context of global warming**
- Genetic Improvement of C4 grasses for biomass production and utilisation
- CRISPR/Cas as a new tool for plant breeding: development and risk assessment OU "Gene editing for efficient plant breeding : development, risk and assessment"
- Combining plant traits optimally for improved and sustainable crop protection strategies

Agricultural management of crops

Topic titles proposed:

- New crops adapted for sustainable agricultural production in Europe
- Diversifying European cereal-based rotations to secure food production under climate change
- Assessing and reducing crop production instability
- Towards a safe and sustainable production of healthy and high quality fruits in Europe

Management of diseases

Topic titles proposed:

- **Management of phytobiome for plant growth promotion and protection against major plant pathogens**
- Management of annual crops for durable resistance to diseases: learning from success stories.

Animal production improvements (including under a context of climate change)

Addressing :

2.3 Functional ecosystems, sustainable food systems, healthy lifestyles.

2.4 Boosting major innovations on land and sea – new products, value chains and markets

Livestock management

Topic titles proposed:

- **Adaptation of farm mammals to environmental changes through early programming and genome editing**
- **Assessing phenotypic, genetic and functional correlations between trypanotolerance and production traits in cattle**
- **Processes of insects' responses to global change**
- Competitiveness and adaptability of livestock farming systems facing global changes
- Efficient and robust animals adapted to new European feed sources
- Precision Livestock Farming
- Emissions of livestock production : measurement, reduction and mitigation

Animal health issues

Topic titles proposed:

- **One Health/Ecohealth promotion and practical implementation at the human - animal - environment interface: improved sustainable collaboration around surveillance and control of priority health issues**
- **Impact of vaccination on pathogen evolution**
- Development of vaccines against African Horse Sickness
- Novel technologies and strategies for the improvement of vaccination in domestic animals
- Toward antibiotics (and anthelmintics) free animals
- Modulation of the immune response to control mastitis and metritis in cattle
- Animal welfare supporting animal health
- Host-directed therapies to control poorly tractable major livestock infectious diseases

Emerging and re-emerging risks under global changes and adaptation

Addressing :

2.1 Addressing climate change and resilience on land and at sea

2.3 Functional ecosystems, sustainable food systems, healthy lifestyles.

Risks related to animal health

Topic titles proposed:

- **Impact of land use change and development on the emergence of pathogens (eg. in developing countries)**
- **Hybridization in parasites : an important but still almost unknown mechanism for parasite evolution, promoting the emergence of human and animal diseases**
- Development of improved diagnosis and typing tools for Glanders in equids, a re-emergent zoonosis
- Determination of food-borne pathogens adaptive strategies and contamination routes

Risks related to plant health

Topic titles proposed:

- **Fighting against grapevine mortality in Europe**
- **Processes of insects' responses to global change**

Risks related to food safety and food transformation

Topic titles proposed:

- **Evaluation, characterization and control of the pathogenic protozoan parasites, emerging hazards in food**
- **Identification and validation of intervention strategies for decontamination of norovirus and hepatitis A virus by food process** : definition of the most reliable surrogates of pathogenic enteric viruses for each treatment / process usable in agro-food industries
- **Effect of climate change on pathogenicity of foodborne pathogens and toxinogenic fungi**

Risks related to forests

Topic titles proposed:

- **Innovative Tools for the Evaluation and management of multiple forest risks**
- **Resilience of tropical forests**
- **Forest management tools predicting wind risk and wood quality in heterogeneous landscape for sustaining European forest production**
- Impact of environmental changes on reproduction of forest trees

Safe Ocean

Topic titles proposed:

- **Our common future ocean – quantifying coupled cycles of carbon, oxygen, and nutrients for determining safe operating spaces with respect to ecosystem stressors/impacts, climate feedbacks, short/long-term sustainability, and related multiple mitigation targets**
- **Sustainable fish and shellfish aquaculture in a changing climate, under threat by harmful algal blooms and molluscan diseases**
- Ocean safe : Emerging Marine Toxins: Toxicity mechanism, Detection, Survey

Enabling technologies (including bio-based products) and Innovation in agro-food systems

Addressing :

2.2 Making the transition towards a circular bioeconomy

2.4 Boosting major innovations on land and sea – new products, value chains and markets

Big data / digitisation

Topic titles proposed:

- **A digital research platform to link SC2 actors and initiatives to the European Open Science Cloud (EOSC)**
- **Connectable sensors for the non-destructive assessment of fleshy fruit and vegetable quality**
- Computational approaches towards sustainable complex agri-food systems
- ICT-enabled solutions for unlocking innovation in food industry

Blue Technologies

Topic titles proposed:

- **Studying microalgae biology to boost Blue Growth**
- **Broodstock and early life history stages feeding, influence of abiotic factors on larval performance linked to epigenetics**
- **Exploring conservation and economic opportunities of fishing lower in the trophic chain**
- **Novel molecular tools for simultaneous diagnostics of multiple pathogens in fish**

Circular bioeconomy and waste management

Topic titles proposed:

- **“Studying the implications and policy directions of circular bioeconomy in European territories through LCA methodologies”.**
- **Water reuse in food industry for a better preservation of water resources**
- **Sustainable food production using human inedible agro-products as animal feed**
- Reducing food waste, improve food chain sustainability and consumers safety, through an Innovative "multiplexed" approach for food shelf-life
- The use of bioactive-rich co-products to reformulate highly consumed food products containing additives with adverse effects

Land-use and energy nexus

Topic titles proposed:

- **Agriculture and solar energy synergies**

Improving food products and new labels

Topic titles proposed:

- **Clean label : science-based initiatives for food**
- **Acknowledgement of raw materials variability for an optimization process on the quality of processed products : new approaches and new decision support systems**
- **EU pulses as protein ingredients in transformed food products**

Consumption and consumer behaviours

Addressing :

2.3 Functional ecosystems, sustainable food systems, healthy lifestyles.

2.5 Developing smart, connected territories and value chains in rural and coastal areas

Changes in consumption modes and food transition

Topic titles proposed:

- **Risk-Benefit Analysis to support healthy and sustainable lifestyle and consumption of products from land and sea**
- **Emerging consumption patterns as open innovations for responsible consumption**
- **New Methods to Measure and Analyze Food Consumption Behaviors**
- **Alternative protein sources: challenge for agriculture, industry, environment and health of Europeans**
- Sustainability of meat production
- Changing Food Consumption Practices in Turbulent Europe

Diet-related diseases : prevention and treatment

Topic titles proposed:

- **Understanding the physiological basis of the non coeliac gluten sensitivity (NCGS) to improve the well-being and the health of patients suffering from this pathology**
- **Development of an allergenicity risk assessment strategy to support a safe introduction of new and sustainable food proteins.**
- Prevention strategies for allergies through diet (Specific challenge : to prevent allergies in children at atopic risk and to improve the under-standing of the pathology)
- Fighting diet-related chronic diseases with smart fermented food products
- Inter-individual variation and personalized foods.

Territorial development and social innovation

Addressing :

2.4 Boosting major innovations on land and sea – new products, value chains and markets

2.5 Developing smart, connected territories and value chains in rural and coastal areas

Territorial management and ecosystem services

Topic titles proposed:

- **Development, sustainability and resilience of the European mountain rural areas. An holistic approach based on a multipurpose chesnut tree.**
- **Improving/Promoting the preservation and sustainable development of Mediterranean and Black Seas ecosystemic services in a globally changing environment.**
- **Safety and environmental benefits of organic food and rural development**
- **Continuum watershed to river runoff**
- **Quantifying and mapping soil services to policy advisor and land use planning**
- **Thinking integrations between crops and livestock for a sustainable territory management**
- Services provided by livestock production systems
- Undisputed quality of food of animal origin
- New concepts for territorial development: a pan European network : ‘Enhancement of food security and local quality of life by new public-private platforms in circular food and bio-based transformation systems’

Social innovation

Topic titles proposed:

- Functions of Collective Urban Gardening and Urban Micro-farms for smart, sustainable and inclusive
- Understanding the specificities “artisan” food systems: norms, sustainability, biodiversity and resilience
- Promoting market organizations for integrating smallholders to agricultural value chains in Africa
- Improving the social acceptability of aquaculture development in European waters