FACCEJPI

Agriculture Food Security and Climate Change

Report of

FACCE-JPI Mapping and Foresight

# Broad-Based Concluding Meeting

*Options for strategic collaboration*

24th June 2013

Copenhagen, Denmark

AGRICULTURE, FOOD SECURITY & CLIMATE CHANGE

The sectors of agriculture and forestry are highly exposed to climate change, since they directly depend on climatic conditions, while emissions from agriculture in the Union account for 14% of global greenhouse gas emissions. Climate change is also one of the main challenges to agriculture in feeding the world's population, which is expected to reach 9 billion by 2050. Global demand for food is expected to have increased by 50% by 2030 and to have doubled by 2050, at a time when demand for biomass for non-food purposes is predicted to grow strongly. Concerted actions are needed to prevent these combined risks from leading to irreversible damage, and to achieve sustainable food supply under changing climate conditions.

The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) brings together 21 countries and aims to improve the collaboration in research policies and research effort of its member countries to tackle these global challenges for Europe by aligning research programmes among Member States.

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This report could not have been conceived without all efforts and dedication of all the participating Member States of FACCE-JPI and all participants of the Broad Based Concluding Meeting.

The report may be quoted provided that the source is acknowledged.

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# Summary

A Joint Programming Initiative is a Member State-driven initiative to join forces in research and education to tackle societal challenges of common interest. FACCE-JPI is the joint programming initiative on *Food security, Agriculture and Climate Change*.

In order to identify opportunities and activities for collaboration, five *mapping* exercises, focused on key areas in food security, agriculture and climate change, have been performed in the last two years. In these meetings delegated policy and science experts from participating countries met to exchange information and views in order to create a common context and to identify opportunities for joint programming. The outcomes of the first four mapping exercises provided input for the elaboration of the first edition of the Strategic Research Agenda of FACCE-JPI that was published in December 2012. The outcomes of the fifth mapping exercise will be used for revising the SRA at the end of 2013.

This report describes the outcomes of the last step of this procedure: the Broad-Based Concluding Meeting (BBCM). The objective of this meeting was to provide a global vision of the five previous mapping meetings with the aim to obtain precise inputs for the elaboration of the Implementation Plan and the updating of the Strategic Research Agenda. In addition, several discussion tables and a 'sticker session' were performed during the BBCM, resulting in a list of amendments for the final Implementation Matrix with indications of national supports for the proposed topics and concrete remarks on cross cutting issues and cross-thematic aspects..

The BBCM brought together forty seven participants from nineteen countries. There were representatives from the FACCE-JPI Governing Board, Scientific Advisory Board, Stakeholder Advisory Board and the Secretariat, as well as members of the rest of the work packages of the FACCE-CSA project. Moreover, speakers and representatives of the following organisations contributed to the meeting: Wageningen UR (NL), Universidad Politécnica de Valencia (ES), Lebensministerium (AT), BLE (DE), TI-MA (DE), DEFRA (UK), RCN (NO), EZ (NL) and DASTI (DK) as local host.

The main outcomes of the meeting can be summarized as follows:

**With regard to Alignment:**

Alignment of national programmes is the core of FACCE-JPI and it was recommended to develop actions of sufficiently broad scientific scope to generate critical mass and broad support also in terms of policy. Reflecting the notion that clusters of topics can bring critical mass among national priorities, five broad areas for consideration are: 1) Resilient agriculture; 2) Protein; 3) Soil; 4) Resource efficiency; 5) Modelling and valuing ecosystem services. In some areas proposed topics for Knowledge Hubs and for collaborative research could be addressed through a combined approach. The highest ranked topic - supported by most countries, as well as from science and stakeholder view - is *options for sustainable intensification of European crop and livestock systems* to be developed through a Knowledge Network. Another topic for which many delegates indicated support and interest is the *improvement of agricultural soil quality*.

**On cross-thematic aspects:**

- Regional aspects. Regions within the EU must be defined according to three dimensions: i) climate-soil, ii) social/economic/cultural characteristics and iii) specialisation of farming systems. Presently the SRA does not sufficiently address regional needs.
- Scale and chain. Scale selection is critical and depends on the research questions to be addressed. It should be considered that conflict of interests may appear among different parts of the food value chain.
- End-users (Implementation of innovation). It seems critical to provide incentives to farmers and industry towards adopting new knowledge and technology and to bear in mind the important role of communication and publicity.
- Open data access and standardisation. Incentives to stimulate open access and standardisation are needed.

**About the Implementation Matrix:**

The topics in the Implementation Matrix annexed to the implementation plan as of July 24th 2013 were considered as not perfectly described and it was remarked that the concept Implementation Plan does not yet take into consideration cross-cutting aspects. It was suggested that a number of issues could be combined among the different areas creating clusters of topics.

**On the 'stickers session' and desk study:**

Thanks to the involvement of the meeting participants, the 'stickers session' was a successful experience. In addition, it has proved to be a valuable approach to know the main priorities and needs of the participating countries. It is remarkable that the regional analysis of the stickering results shows clear divergences of preferences among Northern and Southern Europe countries. Regarding these results, it would be advisable to consider the priorities of each region in the Implementation Plan in order to avoid undesirable unbalances.

# 1. Introduction and background

## FACCE-JPI and foresight activities

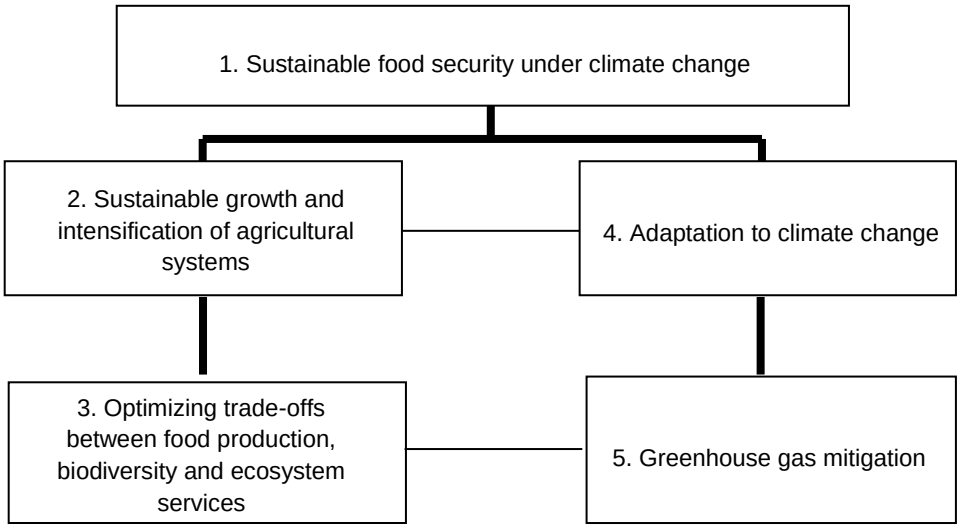
The Joint Programming Initiative on Food Security, Agriculture and Climate Change (FACCE-JPI) brings together 21 countries with the aim to enhance the cooperation and alignment of research efforts and policies among the member countries. This is essential to tackle global challenges that Europe is facing.

Within the Coordination and Support Action for this JPI (FACCE-CSA), Work Package 2 (WP2) has conducted Mapping and Foresight activities for Strategic Collaboration. The goal of WP2 is to use the results of the mapping exercises to support the FACCE-JPI in the development of a Strategic Research Agenda (SRA) and the Implementation Plan (IP).

The WP2 team is composed by Wageningen University and Research Centre (Wageningen UR); the Ministry of Economic Affairs (EZ) from The Netherlands; and the National Institute of Agriculture and Food Research and Technology (INIA) from Spain.

## Five core themes; five mapping meetings

The five Core Themes (CTs) identified in the Scientific Research Agenda (SRA) of the FACCE-JPI were used as basis for the WP2. These five CTs and their interconnections are as follows:




In the last two years the WP2 team has organized five mapping meetings (MMs) focusing on each of these CTs:

- Mapping Meeting 1: **Greenhouse gas mitigation (CT5).** Ministry of Economic Affairs, Agriculture and Innovation; The Hague (The Netherlands); 20th and 21st June 2011.

- Mapping Meeting 2: **Climate change adaptation (CT4).** National Institute of Agriculture and Food Research and Technology (INIA); Madrid (Spain); 22nd and 23rd February 2012.

- Mapping Meeting 3: **Assessing and reducing trade-offs between food supply, biodiversity and ecosystem services (CT3)**. Department of Agriculture, Food and Marine of Ireland; Celbridge, Dublin (Ireland); 11th and 12th July 2012.

- Mapping Meeting 4: **Sustainable food security under climate change (CT1).** National Institute of Agriculture and Food Research and Technology (INIA); Madrid (Spain); 17th and 18th October 2012.

- Mapping Meeting 5: **Sustainable growth and intensification of agricultural systems (CT2).** Federal Ministry for Food, Agriculture and Consumer Protection; Berlin (Germany); 10th and 11th April 2013.

This report describes the last step of this procedure: the Broad-Based Concluding Meeting (BBCM) which took place in Copenhagen (Denmark) on 24th June 2013. The report describes the scope, approach, boundaries and outputs of the meeting. It also provides a compilation of information resulting from a desk study (compilation of topic priorities in the Implementation Plan, and conclusions and recommendations to the Governing Board of FACCE-JPI.

The reports of all five Mapping Meetings and of the BBCM are available at http://www.faccejpi.com/Document-library/Mapping-meeting-reports.

### Implementation Matrix

The first biennial implementation plan (in preparation and to be renewed every two years) reflects how to proceed in order to implement a set of priority actions to be launched in 2014-2015. The plan is elaborated according to three categories of research areas:

- Cat.1: Mature research areas;
- Cat.2: Emerging research areas; and,

- Cat.3: Areas where there is a need for common European efforts and developing research.

The elaboration of the Implementation Plan is an inclusive process with the participation of the Governing Board (GB), the Scientific Advisory Board (SAB) and the Stakeholders Advisory Board (StAB) with the support of FACCE-CSA and the Secretariat.

The implementation of the SRA will require several actions, as defined in the draft Implementation Plan document:

- Alignment between national strategies and programming (Cat. 1) (resulting in e.g. Knowledge Hubs, Knowledge Networks, new ERA-NETs, sharing research infrastructures).
- Exploratory workshops or ideas laboratories for emerging areas (Cat.2)
- Greater efforts across Europe through new funding (Cat. 3), either through Horizon 2020 or through transnational activities (e.g. the FACCE-JPI ERA-NET Plus on climate smart agriculture, joint calls with ERA-NETs, and collaboration of FACCE-JPI countries in global initiatives organising calls).

The input from FACCE-JPI for Horizon 2020 given in April 2013 took into consideration topics for collaborative projects, new ERA-NETs, and for infrastructures.

An Implementation Matrix (IM) has been elaborated in order to show, in a table, areas within the five core research themes crossed with the three categories mentioned. The Secretariat compiled GB, SAB and StAB inputs into priority actions based on the SRA and outcomes of mapping meetings in a process involving two meetings of the Working Group on Implementation (IPWG) which was put in place by the GB in March. This IM has been used to prepare the Posters showing the FACCE-JPI Matrix on Implementation in table format on five pages, one for each Core Theme (see annex 6). The Implementation Plan and the IM formatted in posters have been used as basis for discussions in the BBCM, and will be further elaborated with the outputs of this meeting (see Annex 6).

## Toolbox of potential funding instruments

In order to assign tools to implement the topics identified in the three categories of the Implementation Plan, the FACCE-CSA WP3 has elaborated a toolbox of potential funding instruments for FACCE-JPI joint actions. This document explains

i) the existing **funding models**: a *virtual common pot:* with countries and regions paying for their own participants; a *real common pot*: with the contributions being centrally administrated as a single budget; and a *mixed model*: allowing proposals to be funded according to a ranking); and describes
ii) the following **funding tools**: centre of excellence (CoE), thematic annual programming (TAP), calls for transnational projects (small collaborative projects funded in the frame of ERA-NETs, large collaborative projects in RTD EC calls, and one page proposals as a preparative phase for other proposals), knowledge hub, coordination of national-funded research (COST), common talent programs (Marie Curie), research infrastructures (RI), venture challenge (VC), sandpit-ideas lab (SAND), smart specialization (SPE), ERA-NETs in H2020, and Article 185.

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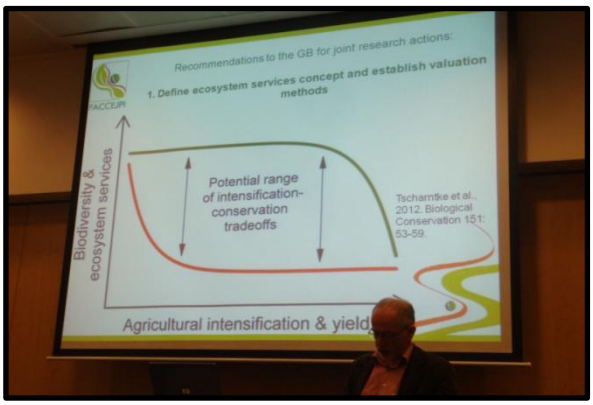

Recommendations to the GB for joint research actions:
1. Define ecosystem services concept and establish valuation methods
Biodiversity & ecosystem services
Potential range of intensification-conservation tradeoffs
Tscharntke et al., 2012. Biological Conservation 151: 53-59.
Agricultural intensification & yield

efficiency seeds and breeds,
innovations in agriculture
of soil functioning and

# 2. The Broad-Based Concluding Meeting

## 2.1. Objectives

The objective of the BBCM is to provide a global vision of the five previous mapping meetings with the aim to obtain precise inputs for the elaboration of the Implementation Plan and the updating of the SRA. This will require the commitment of the Member States (MS), cooperating and aligning national programmes by co-funding common actions. The outputs of the BBCM include a list of amendments for the final Implementation Plan and indications of national supports for the proposed topics and concrete remarks on cross cutting issues and cross-thematic aspects for specific topics.

## 2.2. Structure and methodology

The meeting was hosted by the Danish Agency for Science, Technology and Innovation (DASTI) and a welcoming speech was delivered by Peter Olesen from the Danish Council for Strategic Research. The meeting brought together policy representatives from eighteen countries, seven FACCE-CSA members (in addition to the meeting organisers), three SAB members, three StAB members, nine science and policy experts additionally invited from the list of previous mapping meeting participants, five members of the WP2 team and three DASTI local hosts. The meeting was chaired by Annette Wijering (FACCE-JPI GB member The Netherlands), and Jean-François Soussana (FACCE-JPI SAB chair)

### Part 1: Plenary introduction and background

After the opening by the chairs plenary introduction and background presentations were held, introducing the objectives of the meeting, by Christine Bunthof (FACCE-CSA WP2) and themes and topics closely related to the meeting: the toolbox for joint actions for FACCE-JPI by Nicolas Tinois (FACCE-CSA WP3); ESFRI Infrastructures in Biological Sciences, by Gabriela Pastori (FACCE-CSA / ESFRI working group BMS) and the state of art of the Implementation Plan, by Marina Montedoro (GB Vice-Chair, heading the FACCE Working Group on implementation).

The key outcomes of the five previous MMs were presented. The speakers were Herman Eijsackers (MM1), Jean-François Soussana (MM2), Lijbert Brussaard (MM3), Jose María García Alvárez-Coque (MM4), and Hartmut Stalb (MM5).

### Part 2: 'World café' discussion session

This session started with a stakeholders view on implementation presented by Tania Runge (chair of the StAB) and the introduction and guidance to the break-out working ?groups, by Nuria Duran (FACCE-CSA WP2).

#### A. Discussion session in world café format

The session was organized to discuss, in a "world café" format, four cross-thematic issues horizontally connected with the core research themes (regional aspects, scale and chain, end-users, open data access and standardization) and the areas in the three categories of the IP (Cat.1/alignment, Cat.2/emerging areas and Cat.3/new funding). Seven discussion tables formed by a moderator and five/six participants were established (see annex 3):

- Four of the discussion tables addressed the **four cross-thematic issues, each table covering one issue**. It aimed at defining a common understanding of each issue and to further explore and elaborate these aspects. In order to foster the debate, five questions, previously defined for each aspect, were raised to help exploring each issue. The moderators and reporters of the four discussion groups on cross-thematic aspects were asked to make a comprehensive summary of

the conclusions reached in each group to be presented in the plenary discussion and the GB meeting.

- The three other discussion tables addressed **the three categories** in which areas within each core research theme have been classified in **the Implementation Matrix (IM)**. The objective of each discussion table was to get a common understanding and, if possible, consensus among the participants and to consider possible tools for joint actions before the prioritising of these last ones in the final discussion session. The active discussions were organized around different issues: clarification, impact and consensus of the topics, and assigning tools to topics.

**B. Indications of support for areas in the matrix**

After the discussion sessions, the 'stickers session' took place, where the participants were asked to indicate the support of their country/institution to research areas by putting stickers on the posters of the IM that were shown in the wall of the discussion room.

The 'stickers session' followed a strict **procedure**:

- **Set of votes**: each country and sub-group was given only one set of votes. These set of votes included:

    - 3 votes for "alignment topics" (Cat.1)
    - 4 votes for "emerging topics" (Cat.2)
    - 7 votes for "new funding topics" (Cat.3)

    The number of stickers for each category of topics (Cat.1, 2, 3) varied according to the number of subjects in each category. The votes were compiled by WP2 team and have been subjected to a desk study.

- **Participants** were divided in 3 groups representing their 'position' within FACCE and/or background to cover different points of view: "Policy", "Science" and "Stakeholders" (see annex 4):

    - The "Policy" group gathered all country representatives (GB members and others). Each country was given only one set of votes. There were 19 countries voting.
    - The "Science" group was divided in 4 sub-groups: animal sector (AN), plant sector (PL), land-use sector (LU) and socio-economic sector (SE). Each sub-group was given only one set of votes. Hence there were 4 "Science" sub-groups voting.
    - The "Stakeholders" group was divided in 3 sub-groups: farmers (FA), industry (food companies etc.) (IN) and consumers (CO). Each sub-group was given only one set of votes. Hence there were 3 "Stakeholder" sub-groups voting.

## Part 3: Plenary reports of discussion and 'stickers session' outcomes

After the "stickering" session, reporters from each of the groups on cross-thematic aspects presented their conclusions and a wrap-up of the indications of support for areas and instruments was conducted by Herman Eijsackers (Wageningen UR). Finally the meeting was closed by Peter Keet (former FACCE-CSA WP2/ inventor of the mapping meeting concept, GPC alternate member).

# 3. Outcomes of the meeting and desk study

## 3.1. Outcomes of the discussion session

### 3.1.1. Cross Thematic Aspects Groups

**Discussion table 1: Regional aspects**

1. Definition of region: to define a region three dimensions should be taken into account: climate-soil (exposure to climate change); social/economic/cultural (adapting capacity depending on GDP, educational level, policy commitment) and specialisation of farming systems (diversified agro-systems are more resilient).
   Climatic regions may vary in time in their geographic dimension. Hence projections are needed to find out how tomorrow's regions will be.

2. "Regions" in the FACCE-JPI StRA: currently, the SRA focuses on European added value rather than regional needs (although it refers to "large regional differences" and diversity of systems in Europe). However, collaboration among regions might be useful. It is critical to identify which topics are best addressed on a regional scale, and which are best addressed at European level. Strategic research is more likely to be addressed at regional level than basic research.
   Regional aspects are currently taken into consideration in CT1, 2 and 3. They are implicitly present in CT4 and 5 ("Smart specialisation" in the scientific scope of the new FACCE ERA-NET Plus)

3. Actions proposed:

   - Establish collaborations between FACCE-JPI and the European Environmental Agency to define regions by crossing the 3 dimensions (e.g. RURAGRI, ESPON as source of regional data).
   - Collaboration among regions: i) to define hotspots for vulnerability (importance of primary sector, recipients of cohesion funds; dryer/more continental climate/ perennial crops); ii) "Rich regions" interested in climate change and in carrying out a vulnerability analysis could be interested in collaborating with FACCE.

**Discussion table 2: Scale and food chain**

1. Levels of scale in the food chain: scale of analysis for the FACCE IP is not unique. No scale (plot, farm, landscape, season etc.) can be ruled out. The adequate selection of scale mainly depends on the research issues and problems to be solved; therefore, it is part of the research process for each theme, programme or project.

2. Possible conflicts of interest: conflict of interest may appear among different parts of the food value chain. Nevertheless, topics and approaches to investigate them must be of help to overcome possible trade-offs. In particular, food chains can be seen as cycles, not in a linear way, and there are many entry points to the value chain analysis, but interactions and synergies between stakeholders must be considered within the philosophy of integration.

3. Scale and innovation: innovation is a broad concept that must be adapted to the specific agricultural and food systems, various issues and different contexts. Sometimes global problems need local solutions and local problems need global solutions. Two main aspects to be considered are risks and vulnerabilities, both in connection with food security and climate change.

4. Different approaches of innovation: innovations affect products, processes, organizations, marketing and function. Innovations are not only technical but can also be social and organizational. All approaches are needed.

5. Differences in scale and chain on the IM: the topics identified for the IM are the starting points with many possible scales that, as indicated above, will be selected depending on the problem. In summary, an integration of food systems' perspectives is needed. Coordination with other initiatives is also advisable in order to take the best of the FACCE-JPI and avoid overlapping.

### Discussion table 3: End-users (implementation of innovation)

1. End-users of research and innovation: end-users are all those influenced by the impacts coming of the research and innovation. All end-users should be able to present their input into the Strategic Research Agenda via the representative organisations of their countries and sectors in the GB and StAB.

2. Role of society as end-user: 'Society' is not an end-user in a strict sense, but parts of the society are end-users with different roles. Society plays an important role in the form of public opinion with effect on politics, trade and science.

3. Implementation of agricultural research and innovation: incentives to farmers and industry may help them to adopt new technologies and new knowledge. Incentives could be funding, ambassadors, or vouchers for research or one-on-one training with farmers. Market product standards may encourage innovation. Within FACCE, the StAB should be more strongly involved in decisive steps, e.g. evaluation of research projects.

4. Role of intermediaries and publicity: communication (news, magazines, trade shows, extension services, supply-chain-organized workshops) can be considered as intermediaries to help implementing innovation. European Innovation Partnerships (EIP) may have an important role in that context.

5. Interest of end-users on the IM: the involvement of StAB is one way to address the IM. Another way is to discuss the IM at national ministerial level.

### Discussion table 4: Open data access and standardization

1. Accessibility to research results, advantages: it is necessary to support the creation of new collaborative networks on multidisciplinary basis, as they are the perfect tool to foster creativity. On the other hand the creation of big databases is critical in order to face the big questions and challenges on research.
   One good example of collaboration is the sharing of knowledge among farmers (end users) that have historically taken advantage of common experiences and knowledge.

2. Problems of sharing data and approaches: in order to avoid conflicts, it is important to mention that knowledge sharing and collaborations have to be carried out in the defined ethical framework and context of usage.

3. Incentives to stimulate open access and standardisation: New means of high quality dissemination, that very often require open access, should be taken into account (further than the journal impact factor of collaborations). Another important measure would be to explore funding instruments to foster sharing of data, time and resources.

4. Recommendations:

   - Alignment of data sharing policies through the use of existing platforms, the creation of new platforms at national and European level, the implementation of joint calls and learning from successful stories.

- Learn from MACSUR on: data management and data sharing, establishing standardised methods and integrating datasets.
- Provide resources: to handle, store, annotate, and preserve data and models; for evaluating quality, training skills and community building.

### 3.1.2. Implementation matrix groups

**Discussion table 5: Matrix areas of topics for alignment (Cat.1)**

1. Content of the topics

The discussion started with remarks on the description of the topics for alignment. The group noticed that the topic descriptions were in general very short, not clearly formulated in the sense that it is more a description of the problem than the formulation of a clear research question. Therefore the interpretations of the text in the matrix may be confusing. Moreover the relations with the cross-cutting issues (regionality, scale, end-users, and open data access) are not yet clearly mentioned in the descriptions of the topics. The group also discussed if it's better to have broad or narrow formulated topics: in the matrix most of the areas have a broad description, which is preferred in the early stage of identifying topics for joint activities; however topics should be narrowed down further on in the implementation process. As stated in the draft implementation plan, a topic for alignment can lead to different activities for FACCE-JPI to undertake or advocate. Also by using broad descriptions of topics, the overlap between topics increases. There are a number of topics that deal with soil quality (nutrients, water, C-sequestration, etc.), scattered over the matrix in the current version of the Implementation Plan; these topics can be clustered to better match a programming scale on which countries may wish to join forces. Some strongly related topics can easily be combined. For some alignment topics a clearer description is suggested, as listed below.

2. Impact of the topics

Some topics within a given CT show strong relationships with other CTs. It was noticed, that each CT has one or several topics related to the common use of data bases, sharing research results and resources (genetic resources and collections), monitoring and standardization of measurement procedures. However, it has to be noted that, currently, the data-base sharing is in general not a popular topic among national funders and scientist. In this respect it was suggested (i) to organize small activities, such as workshops or debates, in order to reach the progress needed, and (ii) to look for collaboration with other partners avoiding overlap with already on-going initiatives.

3. Some remarks on individual topics

- 1.1.3. *Knowledge Hub on experimental climate change studies*. Animal livestock is missing and should be included.
- CT2, *collaboration with EIP*. The proposed research project is driven by the national research programmes, but for the collaboration with the EIP the funding is not clear. This problem has to be solved.
- 2.1.1. *Agricultural soil restoration.* Soil restoration focus is to improve the soil quality in general.
- 3.1.1. *Knowledge Hub on monitoring biodiversity and ecosystem services.* A good understanding of biodiversity and ecosystem services is needed in relation to the agricultural systems throughout Europe. The monitoring part seems to be strongly linked to the MAES (Mapping and Assessment of Ecosystems and their Services) EU Initiatives. It was recommended to avoid overlap and to invest in collaboration with MAES.
- 3.2.2. *Regional Hubs.* Regional hubs do not yet exist. The content of this topic needs a better definition. The main focus should be on resource efficiency; increasing agricultural production while using fewer resources (nutrients, water, pesticides, energy, etc.) and enhancing biodiversity. The production restrictions in order to maintain the present biodiversity are currently

not acceptable to farmers. This is an example that the experience of farmers in field situations is needed in the early phases of the process for joint activities.
- 4.1.1 and 4.1.4. Both topics on phenotyping can be combined. There is already knowledge on this subject, mainly in private hands with no free access.
- 4.1.2. *Knowledge Hub on plant epidemiology.* This topic concerns only plants, but the effects of climate change on emerging animal diseases is also important.
- 5.1.1. *GHG Emissions.* Collaboration with GRA and CGIAR is needed.

4. Consensus on topics

The group reached consensus with the highest priority for two topics: 2.1.1 on soil quality and 3.1.1 on measuring biodiversity and valuing ecosystem services. These topics were considered as the most important ones and activities, both through alignment and with new funding, should be developed and start as soon as possible. Topics 2.1.2 and 4.1.2 are considered also of high impact, but less urgent.

## Discussion table 6: Matrix areas of topics for emerging subjects (Cat.2)

1. Content of the topics

The participants on the table agreed on the fact that the topics were poorly described, and some ar even out of the scope of FACCE. Some topics need clarification because otherwise they may be interpreted in different ways. Two topics (2.2.1 and 2.2.2) included in CT2 were not considered as research topics. Topic 3.2.1 *(Training on functional biodiversity)* is not a research topic and is not related to Climate Change. Even though these aspects need to be considered they should probably be removed from the Implementation Matrix.

2. Impact of the topics

The topics within a given CT were not very well classified. In general, some topics are interconnected with other ones in other CTs or even included in a different category.

3. Some remarks on individual topics

- 1.2.1. *Methods for better integrating research on food economics and climate change* **(“**climate change” should be in bold in the Matrix) was considered interesting and has the support of the IPWG.
- 1.2.2. *Exploring high end climatic change scenarios* was considered the most interesting topic to be addressed through exploratory workshops with a strong connection with the Knowledge Hub MACSUR.
- *1.2.3. Food safety implications of climate change and climate extremes.* It was recommended to remove “climate extremes”, deemed unnecessary.
- *1.2.4. Assessing multi-output / multifunctional agriculture under climate change.* The topic seems to be poorly described and it should be moved to CT2.
- 3.3.2. *Enhancing the appreciation of trade-offs across ecosystem services.* This is a topic in which the expression “the appreciation” should be removed and the description should be re-written. This topic was considered to be undertaken by national projects.
- 4.2.1. *Tactical (short term) risk management for climate variability in agriculture* was considered as potentially important.
- 4.2.2. *Assessment of the potential of perennial field crop species for climate change adaptation.* This was considered a very vague and confusing topic. It was not clear why the topic considered only perennial crops. It was not clear if the topic was intended to focus on plant breeding strategies. A better definition is needed.
- 4.2.3. *Animal health / animal diseases and GHG mitigation.* The description of the topic was considered unclear. It was agreed that more preliminary evidences were necessary in order to

support this topic. It might be included as part of topic 5.3.4 (*Cattle breeding for reduced methane emissions*).

- 5.2.1. *Socio-economic and technological barriers to GHG mitigation***.** The purpose of the topic was unclear and without focus. It needs to be re-written otherwise it can be interpreted in many different ways.

4. Consensus on topics

The group reached a consensus not to give highest priority to any of the topics in this category.

### Discussion table 7: Matrix areas of topics for new funding (Cat.3)

1. Content of the topics

The group noticed an imbalance in terms of the content of the topics: Some topics were very broad whereas others were very narrow. In general, the descriptions of the topics need greater detail and clarification. Many of the topics described are not related with either climate change or food security. It should be kept in mind that the JPI is the intersection of food security, agriculture and climate change. Most of the topics are scattered in different matrix categories and CTs. Those topics holding a relationship among them could be clustered for future development into FACCE implementation actions. Four main clusters could be proposed: i) protein, ii) resilience, iii) soils, and iv) resource efficiency in relation to climate change.

2. Impact of the topics

The main output of this discussion table was the identification of clusters of research. Topics to be clustered were identified within category 3. However, several topics in category 1 were also identified to be included in the clusters. Protein Cluster includes topics 1.3.4, 1.3.8, 1.3.9, and 1.3.10 (category 3); Resilience Cluster includes topics 2.3.8, 2.3.9, 4.3.4, (category 3), and 2.1.2 (category 1); Soils Cluster includes topics 3.3.7, 3.3.6, and 4.3.9 (category 3), and 2.1.1 (category 1); Resource Efficiency Cluster includes topics of 2.3.15, 4.3.7 (category 3), and 1.1.2 (category 1).
It was agreed that the open access to data-bases is not a straightforward issue to implement because in many instances policy makers and scientists hesitate.

3. Some remarks on individual topics

- *1.3.3. Reducing food waste and by-products* should be expanded as "reducing food waste and improving sustainable use of by-products"
- *1.3.9. Impact of diets on GHGs and environment.* It was noted that this topic has only a title without clear scientific meaning and it was questioned if it would belong to the core focus of FACCE. Does it refer to human or animal diets?
- 1.3.11. This topic is related to 2.3.16 because both refer to urban agriculture and production near metropolis. It is unclear whether or not these topics belong to FACCE.
- *2.3.14. Food safety risks* are not related to FACCE and should be removed.
- *3.3.2. Improvement and restoration of pollination services* is not related to FACCE and should be removed.

4. Consensus on topics

The group reached consensus with the highest priority for the topics:

i. CT2: *2.3.8 Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes* and *2.3.9 Developing novel vaccination methods and breeding for robustness (to infectious diseases) in livestock and aquaculture species.*

ii. CT3: *3.3.3 Integrated measurement and modelling of ecosystem services and their values in agricultural landscapes and assessment of the role of agri-environmental measures* and *3.3.7 Soil, the last frontier*.

iii. CT4: *4.3.4 Adaptation in livestock (and aquaculture) to heat* and *4.3.7 Precision water management in crop production at farm and catchment scales.*

## 3.2. Outcomes of the 'stickers session': desk study

Hereunder you will find the analysis of the votes of the sticker session, of which the methodology has been explained in chapter 2.2 (p. 9-10). The outputs of the session have been subjected to a desk study in order to get precise findings. Thus the votes have been studied on category basis (Cat.1 alignment topics, Cat.2 emerging subjects and Cat.3 new funding topics) and on regional basis (Northern, Eastern Central, Western Central and Southern Europe).

The ranking lists in this chapter are cut-off, after a topic or a group, when more than half of the total votes is reached. For complete lists, with all topics and all votes, please consult annex 5.

The topics in the tables are referred to their Implementation Matrix number. Only the most important ones are mentioned in the accompanying text. In order to see their complete definition, please see the Implementation Matrix in annex 6.

### 3.2.1. Alignment topics (Cat.1)

***Table 1**: Ranking of topics (A) and Core Themes (B) in 'Cat.1 alignment' of the Implementation Matrix according to the number of votes received*[1]

| A) Ranking of topics (Cat.1) | | | | |
|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** |
| **2.1.2** | **14** | **4** | **2** | **20** |
| 2.1.1 | 8 | 1 | 1 | 10 |
| 4.1.2 | 5 | 2 | 1 | 8 |
| 1.1.3 | 4 | 2 | 1 | 7 |

| B) Ranking Core Themes (Cat.1) | |
|---|---|
| CT2 | 31 |
| CT4 | 16 |
| CT3 | 15 |
| CT1 | 9 |
| CT5 | 2 |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

The most voted topics are:

- 2.1.2 *Sustainable intensification of major European crop and livestock systems*. This topic was also highlighted by the discussion groups.
- 2.1.1 *Agricultural soil restoration Knowledge Hub.* This topic was also highlighted by the discussion groups.
- 4.1.2 *Knowledge hub on plant epidemiology under climate change.* Highlighted by the discussion groups.
- 1.1.3 *Knowledge Hub. Network of experimental climate change studies on crop and grassland systems.*

CT2 *environmentally sustainable growth and intensification of agricultural systems* is the CT with topics that have received more votes.

### 3.2.2. Emerging subjects (Cat.2)

***Table 2**: Ranking of topics (A) and Core Themes (B) in 'Cat.2 emerging subjects' of the Implementation Matrix according to the number of votes received* [1]

| A) Ranking of topics (Cat.2) | | | | |
|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** |
| **1.2.1** | **7** | **2** | **3** | **12** |
| **4.2.3** | **11** | **1** | **0** | **12** |
| 3.2.2 | 9 | 1 | 1 | 11 |
| 1.2.3 | 9 | 0 | 1 | 10 |
| 5.2.1 | 7 | 1 | 2 | 10 |

| B) Ranking Core Themes (Cat.2) | |
|---|---|
| CT1 | 37 |
| CT4 | 18 |
| CT3 | 14 |
| CT2 | 13 |
| CT5 | 10 |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

The most voted topics are:

- 1.2.1 *Methods for better integrating research on food economics*.
- 4.2.3 *Animal health/animal diseases and GHG mitigation.*
- 3.2.2 *Enhancing the appreciation of trade-offs across ecosystem services at farm level and their economic effects.*
- 1.2.3 *Food safety implications of climate change and climate extremes.*
- 5.2.1 *Socio-economic and technological barriers to GHG mitigation in European agri-food chains.*

CT1 *food security under climate change* has been the most voted one.

### 3.2.3. New Funding topics (Cat.3)

This is the most important category within the Implementation Matrix. Therefore the votes have been subject of a deeper analysis than the previous categories:

- Total Ranking
- Ranking per Core Theme
- Clusters identified
- Ranking per region
- Comparison of regional preferences

To get the most useful outcomes of the session, participants were instructed only to take the topics for collaborative projects into consideration. Of course ERA-NETs and infrastructures are important in international collaboration, but as discussions on these subjects are taking place in a FACCE working group and in the CSA, it was decided to focus here on the topics for collaborative research. Still some stickers were put with ERA-NET and Infrastructure topics. These are left out of the analysis. .

## Total ranking

***Table 3**: Ranking of topics (A) and Core Themes (B) in 'Cat.3 new funding topics' of the Implementation Matrix according to the number of votes received* [1]

| A) Ranking of topics (Cat.3) | | | | |
|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** |
| **1.3.3** | **13** | **0** | **2** | **15** |
| 1.3.4 | 11 | 1 | 2 | 14 |
| 4.3.7 | 10 | 1 | 1 | 12 |
| 3.3.7 | 11 | 0 | 0 | 11 |
| 2.3.8 | 10 | 0 | 0 | 10 |
| 3.3.3 | 6 | 3 | 0 | 9 |
| 2.3.9 | 6 | 1 | 1 | 8 |
| 2.3.10 | 6 | 1 | 0 | 7 |
| 2.3.7 | 5 | 2 | 0 | 7 |

| B) Ranking Core Themes (Cat.3) | |
|---|---|
| CT2 | 51 |
| CT1 | 47 |
| CT4 | 30 |
| CT3 | 29 |
| CT5 | 17 |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

The five most voted topics are:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*
- 1.3.4 *Reducing the protein dependency of European agriculture.*
- 4.3.7 *Precision water management in crop production at farm and catchment scales.* Highlighted by the discussion groups.
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups.
- 2.3.8 *Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes.*

Despite of including only one topic among the six most voted, CT2 *environmentally sustainable growth and intensification of agricultural systems* is the CT that has received more votes in total.

## Ranking per Core Theme

***Table 4**: Most voted topics of each Core Theme in 'Cat.3 new funding topics' of the Implementation Matrix[1].*

| | Ranking of topics per Core Theme (Cat.3) | | | | |
|---|---|---|---|---|---|
| | **Topic** | Policy | Science | Stakeholders | **Total** |
| **CT1** | **1.3.3** | **13** | **0** | **2** | **15** |
| | 1.3.4 | 11 | 1 | 2 | 14 |
| **CT2** | **2.3.8** | **10** | **0** | **0** | **10** |
| | 2.3.9 | 6 | 1 | 1 | 8 |
| | 2.3.10 | 6 | 1 | 0 | 7 |
| | 2.3.7 | 5 | 2 | 0 | 7 |
| **CT3** | **3.3.7** | **11** | **0** | **0** | **11** |
| | 3.3.3 | 6 | 3 | 0 | 9 |
| **CT4** | **4.3.7** | **10** | **1** | **1** | **12** |
| | 4.3.4 | 3 | 1 | 0 | 4 |
| | 4.3.5 | 3 | 1 | 0 | 4 |
| | 4.3.9 | 3 | 0 | 1 | 4 |
| **CT5** | **5.3.6** | **6** | **0** | **0** | **6** |
| | 5.3.3 | 2 | 2 | 0 | 4 |
| | 5.3.4 | 3 | 1 | 0 | 4 |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

The most voted topics per Core Theme are:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*
- 2.3.8 *Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes.* Highlighted by the discussion groups.
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups. Highlighted by the discussion groups.
- 4.3.7 *Precision water management in crop production at farm and catchment scales.* Highlighted by the discussion groups.
- 5.3.6 *Increased soil carbon sequestration in arable systems and grasslands through changes in crop rotations and grassland management.*

## Clusters identified

As explained in chapter 3 (p. 15), the main output of the discussion table 7 (Matrix areas of topics for new funding, Cat.3) was the identification of clusters of research topics, gathering areas from category 3 and category 1. In the table below you will find these clusters and the results of adding up the votes of their topics (within each category).

***Table 5**: Number of votes registered in the clusters of topics defined in "Cat.1 alignment" and "Cat.3 new funding topics" of the Implementation Matrix* [1]

| Clusters (Cat.3 + Cat.1) | | |
|---|---|---|
| **Cluster** | Topic | **Total (Cat.3 + Cat.1)** |
| Resilience | 2.3.8 | 22 + 20 |
| | 2.3.9 | |
| | 4.3.4 | |
| | 2.1.2 | |
| Protein | 1.3.4 | 20 |
| | 1.3.8 | |
| | 1.3.9 | |
| | 1.3.10 | |
| Soil | 3.3.7 | 15 + 10 |
| | 3.3.6 | |
| | 4.3.9 | |
| | 2.1.1 | |
| Resource efficiency | 2.3.15 | 16 + 2 |
| | 4.3.7 | |
| | 1.1.2 | |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

The Resilience cluster stands out as the most important cluster identified.

## Ranking per region

The countries have been classified in four regions, using the same criteria as in the previous mapping meetings' reports.
The tables show the topics most voted by delegates from each European region (Northern, Southern, Western Central, Eastern Central), taking into account country votes only. As each region has a different number of countries, and hence a different number of votes, the topics have been classified in four levels according to their ranking position within the region in order to allow comparisons among regions:

- Ranking level A: topic(s) that gained the most votes
- Ranking level B: topic(s) that gained the second-most votes
- Ranking level C: topic(s) that gained the third-most votes
- Ranking level X: topics that adding up their votes gather less than 50% of total votes

The tables below show A, B and C ranking levels (up to reaching more than half of the total votes). The rest of the topics are below the cut-off. Complete lists are shown in annex 5 where the rest group is categorized as Level X. The tables also show the core research teams that raised the highest votes.

## 1. Northern Europe (N)

***Table 6**: Northern Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking Topics Northern Europe DK, FI, NO, SE (Cat.3) | | | B) Ranking Core Themes N (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **1.3.3** | **3** | **A** | CT1 | 9 |
| **1.3.4** | **3** | | CT2 | 7 |
| **3.3.3** | **3** | | | |
| **3.3.7** | **3** | | | |
| 2.3.7 | 2 | **B** | | |
| 2.3.10 | 2 | | | |
| 4.3.8 | 2 | | | |
| 5.3.6 | 2 | | | |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

Level A topics in Northern Europe are:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*
- 1.3.4 *Reducing the protein dependency of European agriculture.*
- 3.3.3 *Integrated measurement and modeling of ecosystem services and their values in agricultural landscapes.* Highlighted by the discussion groups.
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups. Highlighted by the discussion groups.

## 2. Eastern Central Europe (E-C)

***Table 7**: Eastern Central Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topics Eastern Central Europe AT, EE, PL, RO (Cat.3) | | | B) Ranking Core Themes E-C (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **3.3.7** | **4** | **A** | CT2 | 7 |
| 1.3.4 | 3 | **B** | CT1 | 6 |
| 1.3.3 | 2 | **C** | CT3 | 6 |
| 2.3.6 | 2 | | | |
| 2.3.9 | 2 | | | |
| 3.3.2 | 2 | | | |
| 4.3.7 | 2 | | | |
| 5.3.6 | 2 | | | |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

Level A topics in Eastern Central Europe are:

- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups. Highlighted by the discussion groups.

## 3. Western Central Europe (W-C)

***Table 8**: Western Central Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topics Western Central Europe BE, CH, DE, FR, IE, NL, UK (Cat.3) | | | B) Ranking Core Themes W-C (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **1.3.3** | **6** | **A** | CT1 | 14 |
| 1.3.4 | 4 | **B** | CT2 | 12 |
| 2.3.8 | 4 | | | |
| 4.3.7 | 4 | | | |
| 3.3.2 | 3 | **C** | | |
| 3.3.3 | 3 | | | |
| 3.3.7 | 3 | | | |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).

Level A topics in Western Central Europe are:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*

## 4. Southern Europe (S)

***Table 9**: Southern Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topics Southern Europe IL, ES, IT, TR[2] (Cat.3) | | | B) Ranking Core Themes S (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **2.3.8** | **4** | **A** | CT2 | 12 |
| 4.3.7 | 3 | **B** | CT4 | 7 |
| 1.3.3 | 2 | **C** | | |
| 2.3.9 | 2 | | | |
| 2.3.10 | 2 | | | |
| 2.3.14 | 2 | | | |
| 4.3.4 | 2 | | | |
| 4.3.5 | 2 | | | |

[1]Participants were divided in 3 groups: "Policy" group (country representatives/ 19 countries/ one set of votes per country); "Science" group (4 subgroups: animal AN, plant PL, land-use LU and socio-economic SE/ one set of votes per subgroup) and "Stakeholders" group (3 subgroups: farmers FA, industry IN and consumers CO/ one set of votes per subgroup). Each set of votes included: 3 votes for "alignment topics" (Cat.1)/ 4 votes for "emerging topics" (Cat.2)/ 7 votes for "new funding topics" (Cat.3).
[2]Turkey provided its votes in the Governing Board meeting of the 25th June in Copenhagen.

Level A topics in Southern Europe are:

- 2.3.8 *Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes.* Highlighted by the discussion groups.

## Comparison of regional preferences

In order to get a clearer view of the preferences and differences among regions, a comparison exercise has been carried out. The topics that have been awarded "A" level in any region have been studied in order to see which ranking level they take up in each region (Table 10).

***Table 10**: Comparison of the A level topics in each European region (N, Northern; E-C, Eastern Central; W-C, Western Central and; S, Southern) 'Cat.3 new funding topics'* [1]

| Comparison of "A" level topics (Cat.3) | | |
|---|---|---|
| **Topic** | **Region** | **Level** |
| **1.3.3** | N | **A** |
| | E-C | **C** |
| | W-C | **A** |
| | S | **C** |
| **3.3.7** | N | **A** |
| | E-C | **A** |
| | W-C | **C** |
| | S | **X** |
| **2.3.8** | N | **X** |
| | E-C | **X** |
| | W-C | **B** |
| | S | **A** |
| **1.3.4** | N | **A** |
| | E-C | **B** |
| | W-C | **B** |
| | S | **X** |
| **3.3.3** | N | **A** |
| | E-C | **X** |
| | W-C | **C** |
| | S | **X** |

[1]As each region has a different number of countries (and hence a different number of votes) the topics have been classified in four levels (according to their ranking position within the region) in order to allow comparisons among regions: A; most voted topics / B; second most voted topics / C; third most voted topics / X; topics that adding up their votes gather less than 50% of total votes.

According to the information shown in the table above, we can conclude that there is a clear divergence of preferences between Northern and Southern Europe (1.3.3 A vs C; 3.3.7 A vs X; 2.3.8 X vs A; 1.3.4 A vs X; 3.3.3 A vs X). Regarding Eastern and Western Central Europe, their preferences do not show any remarked divergence with other concrete region.

Taking into account these results, it would be advisable to consider the priorities of each region in the Implementation Plan in order to avoid undesirable unbalances.

# 4. Conclusions

**Recommendation with regard to implementation**

Alignment of national programmes is considered the core activity of FACCE-JPI. There was a broad consensus about the rationale for having alignment as core of the implementation plan of FACCE-JPI. Bringing national programmes in line with each other and towards a common aim will deliver faster progression towards the solutions to the societal challenges addressed. Through alignment of strategy and programmes among Member States we avoid duplication, get better coverage of research gaps, and create critical mass and European added value, so we make better use of the limited resources.

Reflecting the notion that clusters of topics can bring more critical mass among national priorities, five broad areas for consideration are: 1) Resilient agriculture; 2) Protein; 3) Soil; 4) Resource efficiency; 5) Modelling and valuing ecosystem services. It was well-noted that topics for Knowledge Hubs and topics for collaborative research could be addressed through a combined approach of networking through hubs and new funding.

The topic of Category 1 (for alignment) that was supported by most countries, as well as from science and stakeholder, is '*options for sustainable intensification of European crop and livestock systems',* to be developed through a Knowledge Network. Another topic for which many indicated support and interest is '*the improvement of agricultural soil quality'.* Here, the application of Thematic Annual Programming Networks was recommended.

**About the topics in the Implementation Matrix:**

In general the topics presented in the Implementation matrix need to be better defined and described. It was also noted that they do not take into consideration cross-cutting issues. It was suggested that a number of issues could be combined among the different areas in 'clusters of topics' in order to create good opportunities for collaboration and alignment.

- In topics for Alignment (Cat.1)**,** the discussion group reached consensus on 2.1.1 *on soil quality* and 3.1.1 *on measuring biodiversity and valuing ecosystem services* as the most important ones, followed by 2.1.2 and 4.1.2.

- In topics for Emerging subjects (Cat.2), the discussion group did not reach a consensus about supporting specific ones.

- In topics for New funding (Cat.3), the discussion group found that most of the topics are scattered in different matrix categories and CTs. They recommended that certain topics should be clustered into three clusters: i) protein, ii) resilience, iii) soils, and iv) resource efficiency in relation to climate change. The group reached consensus with the highest priority for the topics: i) 2.3.8 and 2.3.9 on CT2; ii) 3.3.3, and 3.3.7 on CT3; and 4.3.4 and 4.3.7 on CT4.

**On cross-thematic aspects:**

- Regional aspects**.** Regions within the EU must be defined according to three dimensions: i) climate-soil (exposure to climate change), ii) social/economic/cultural characteristics and iii) specialisation of farming systems. It should be taken into consideration that Climatic regions may vary in time in their geographic dimension. Presently the SRA does not take enough into consideration the regional needs, which should be established by crossing the three dimensions and through collaborations and specific actions to define *"Hotspots for vulnerability".*

- Scale and chain**.** Scale selection is critical and depends on the research questions to be addressed. Conflict of interests may appear among different parts of the food value chain.

Innovation is a broad concept that needs to be adapted to specific questions taking into account the whole food chain and stakeholder's needs.

- End-users (Implementation of innovations)**.** Society plays an important role in the form of public opinion and will be impacted by innovation. It seems critical to provide incentives to farmers and industry towards adopting new knowledge and technology and to bear in mind the important role of communication and publicity.

- Open data access and standardisation**.** It was considered essential but with limitations depending on whether the research is public or private funded. Incentives to stimulate open access and standardisation are needed.

**On the 'stickers session':**

Thanks to the involvement of the meeting participants, the stickering session was a successful experience. In addition, it has proved to be a valuable approach to gather the main priorities and needs of the participating countries.

**On the desk study:**

The desk study consisted of an analysis of the results of the 'stickers session' in order to provide a precise output of the preferences of the participants within each category. This should be considered as the best system to evaluate the Implementation Plan as a whole.
It is remarkable that the regional analysis of the stickering results shows clear divergences of preferences among Northern and Southern countries in Europe. Regarding these results, it would be advisable to consider the priorities of each region in the Implementation Plan, in order to avoid undesirable unbalances.

Assuming 'Cat.3 new funding topics' as the most important category in the Implementation Matrix, we can conclude that the next **topics** are the **most interesting for the participating countries** of the BBCM:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*
- 1.3.4 *Reducing the protein dependency of European agriculture.*
- 4.3.7 *Precision water management in crop production at farm and catchment scales.* Highlighted by the discussion groups.
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups.
- 2.3.8 *Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes.*

Regarding **regional preferences**, these are the most important topics on 'Cat.3 new funding topics':

Northern Europe:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*
- 1.3.4 *Reducing the protein dependency of European agriculture.*
- 3.3.3 *Integrated measurement and modeling of ecosystem services and their values in agricultural landscapes.* Highlighted by the discussion groups.
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups. Highlighted by the discussion groups.

Eastern Central Europe:

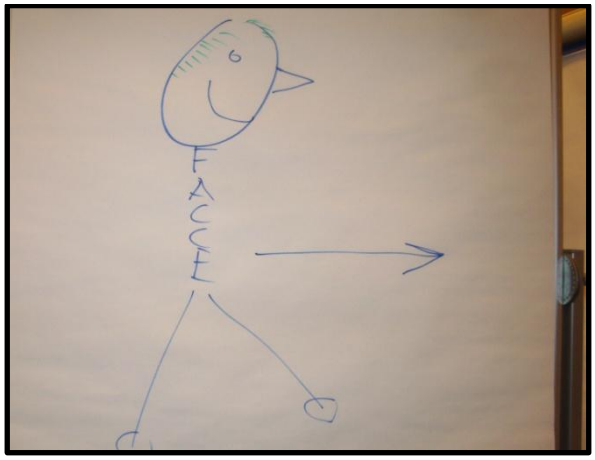
- 3.3.7 *Soil, the last frontier. Functional soil microbiology for productivity and nutrient cycling.* Highlighted by the discussion groups. Highlighted by the discussion groups.

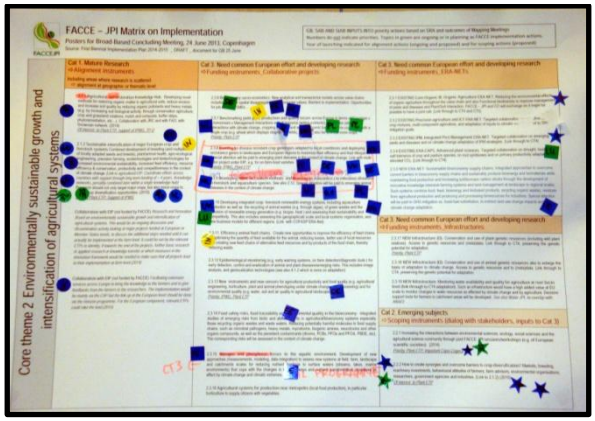
Western Central Europe:

- 1.3.3 *Cost effective approaches to reducing food waste and by-products.*

Southern Europe:

- 2.3.8 *Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes.* Highlighted by the discussion groups.





# Annexes

## Annex 1. Programme of the Broad Based Concluding Meeting

# FACCE-JPI
# Broad-Based Concluding Meeting

**24th June, 2013**
Hotel Scandic Copenhagen
Vester Søgade 6, 1601, Copenhagen, Denmark
Co-Chairs: Annette Wijering (FACCE-JPI GB member The Netherlands)
Jean-François Soussana (FACCE-JPI SAB chair)

| Programme | |
|---|---|
| 10:00 – 11:30 | Morning refreshment buffet (bread rolls, Danish pastry, fresh fruit, juice, coffee, tea) |
| 11:00 – 11:30 | Registration |
| **11:30 – 12:00** | **Opening**<br>Welcome speech by Peter Olesen, Chair of the Danish Council for Strategic Research<br>Welcome speech by co-chair from GB<br>Welcome speech by co-chair from SAB |
| **12:00 – 13:15** | **Part 1. Plenary introduction and background presentations**<br><br>1. **Objective of the meeting** Christine Bunthof (FACCE-CSA WP2)<br>2. **Toolbox for joint actions for FACCE-JPI** Nicolas Tinois (FACCE-CSA WP3)<br>3. **ESFRI Infrastructures in Biological Sciences** Gabriela Pastori (FACCE-CSA / ESFRI working group BMS)<br>4. **Key points of MM1, on CT5 Greenhouse Gas Mitigation** Herman Eijsackers (Wageningen UR, chair MM1)<br>5. **Key points of MM2, on CT4 Adaptation to Climate Change** Jean-François Soussana (SAB chair & participant MM2)<br>6. **Key points of MM3, on CT3 Optimizing trade-offs between food production, biodiversity and ecosystem services** Lijbert Brussaard (Wageningen UR, participant MM3)<br>7. **Key points of MM4, on CT1 Sustainable food security under climate change** José María García Álvarez-Coque (Universidad Politécnica de Valencia)<br>8. **Key points of MM5, on CT2 Sustainable growth and intensification of agricultural systems** Hartmut Stalb (BMELV, co-chair MM5)<br>9. **Implementation, state of the art** Marina Montedoro (vice chair GB, heading WGIP) |
| 13:15 – 14:15 | Lunch in restaurant of Hotel Scandic |
| **14:15 – 17:00** | **Part 2. 'World café' discussion session**<br><br>**Guidance**<br>**A stakeholders view on implementation of FACCE SRA** Tania Runge (chair StAB)<br>**Introduction to the break-out group work** (approach, topics, questions) Núria Duran (FACCE-CSA WP2)<br><br>**Discussion session in world café format (see Guidance for Part 2 and Group Distribution)** |

| | |
|---|---|
| | Four tables for addressing **c**ross-**t**hematic **a**spects:<br>Table 1. CTA 1. Regionality<br>Table 2. CTA 2. Scale and Chain<br>Table 3. CTA 3. End-users (implementation of innovations)<br>Table 4. CTA 4. Open access and standardisation<br>Three tables for addressing the **m**atrix of areas in each core theme:<br>Table 5. Matrix category Alignment areas<br>Table 6. Matrix category New Funding areas<br>Table 7. Matrix category Emerging areas<br>The matrix of areas in each core theme for alignment, new funding, and scoping is enlarged on posters and put on boards. If the discussion group come to a consensus advice for giving priority to a limited number of topics to start working on first, this is shown by highlighting text.<br>The groups, working from expertise point of view, are furthermore asked to indicate which tools are suitable for implementing the areas on the poster.<br><br>**Indications of support for areas in the matrix and instruments on the matrix *from stakeholder position***<br>By putting stickers with areas on the posters of the matrix, participants, grouped to stakeholder positions, may indicate support for areas. |
| 17:00 – 17:30 | Coffee and tea break |
| **17:30 – 19:00** | **Part 3. Plenary reports of discussion and stickering outcomes**<br>(moderator: Herman Eijsackers)<br><br>Wrap up of the indications of support for areas and instruments<br>Reports from each of the groups on cross-thematic aspects and discussion |
| **19:00 – 19:30** | **Final session**<br><br>Food for thought: reflection on the mapping and foresight activities by Peter Keet (former FACCE CSA WP2/ inventor of mapping meeting concept, GPC alternate member)<br><br>Conclusions of the day and next steps by co-chairs Annette Wijering and Jean-François Soussana |
| 19:30 | Closing + toast |

## Annex 2. List of participants

| | GOVERNING BOARD MEMBERS | | |
|---|---|---|---|
| | **Country** | **Name** | **E-mail** |
| 1 | AT | Elfriede Fuhrmann | Elfriede.fuhrmann@lebensministerium.at |
| 2 | BE | Anne Vuylsteke | anne.vuylsteke@lv.vlaanderen.be |
| 3 | CH | Andreas Aeschlimann | andreas.aeschlimann@alp.admin.ch |
| 4 | DE | Hartmut Stalb | Hartmut.Stalb@bmelv.bund.de |
| 5 | DE | Stefan Lampel (part 3 only) | s.lampel@fz-juelich.de |
| 6 | DK | Niels Gøtke | nigoe@fi.dk |
| 7 | EE | Külli Kaare | kulli.kaare@agri.ee |
| 8 | ES | Nuria Durán | duran_nur@ivia.gva.es |
| 10 | ES | Paloma Melgarejo | melgar@inia.es |
| | FR | Marion Guillou (part 3 only) | |
| 11 | FI | Mikko Peltonen | mikko.peltonen@mmm.fi |
| 12 | IE | Richard Howell | richard.howell@agriculture.gov.ie |
| 13 | IL | Yuval Eshdat | vhyuval@agri.gov.il |
| 14 | IT | Marina Montedoro | m.montedoro@mpaaf.gov.it |
| 15 | NL | Huub Löffler | huub.loffler@wur.nl |
| 16 | NL | Annette Wijering | j.g.m.wijering@ez.nl |
| 17 | NO | Gudrun Langthaler | gla@forskningsradet.no |
| 18 | PL | Monika Rzepecka | Monika.Rzepecka@mnisw.gov.pl |
| 19 | RO | Natasia Belc | nastasia.belc@bioresurse.ro |
| 20 | SE | Jan Svensson | jan.svensson@formas.se |
| | **CSA MEMBERS** | | |
| 21 | P1 INRA | Isabelle Albouy | Isabelle.Albouy@paris.inra.fr |
| 22 | P1 INRA | Ophelie Hemonin | Ophelie.Hemonin@paris.inra.fr |
| 23 | P1 INRA | Heather Mckhann | Heather.Mckhann@paris.inra.fr |
| 24 | P2 BBSRC | Gabriela Pastori | gabriela.pastori@bbsrc.ac.uk |
| 25 | P6 JUELICH | Nicolas Tinois | n.tinois@fz-juelich.de |
| 26 | P4 BLE | Johannes Bender | Johannes.Bender@ble.de |
| 27 | P5 BMLFUW | Stefan Ropac | Stefan.Ropac@lebensministerium.at |
| | **OTHER participants** | | |
| | | Peter Olesen (welcome speech) | |
| 28 | SAB (FACCE) | Jean-Francois Soussana | Jean-Francois.Soussana@paris.inra.fr |
| 29 | SAB (FACCE) | John Roy Porter | jrp@life.ku.dk |
| 30 | SAB (FACCE) | Thomas Rosswall | thomas.rosswall@gmail.com |
| 31 | StAB (FACCE) | Tania Runge | tania.runge@copa-cogeca.eu |
| 32 | StAB (FACCE) | Dawn Howard | dawn.howard@effab.info |
| 33 | StAB (FACCE) | Alan Matthews | alan.matthews@tcd.ie |
| 34 | Wageningen UR (NL) | Herman Eijsackers | herman.eijsackers@wur.nl |
| 35 | UPV (ES) | José Mª Álvarez Coque | jmgarcia@upvnet.upv.es |
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| 38 | TI-MA (DE) | Martin Koechy | office@martinkoechy.de; |
| 39 | Wageningen UR (NL) | Lijbert Brussaard | lijbert.brussaard@wur.nl |
| 40 | DEFRA (UK) | Theresa Ekong | Theresa.ekong@defra.gsi.gov.uk |
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| 42 | EZ (NL) | Peter Keet | p.keet@minez.nl |
| | **FACCE CSA WP2 team and Local hosts** | | |
| 43 | P10 Wageningen UR | Christine Bunthof | christine.bunthof@wur.nl |
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| = | P7 INIA | Nuria Durán | duran_nur@ivia.gva.es |
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| 45 | P9 EZ | Louis Fliervoet | l.m.fliervoet@minez.nl |
| 46 | DASTI (Local Host) | Maibrit Kanding | maka@fi.dk |
| 47 | DASTI (Local Host) | Pia Moller Schilder | pmos@fi.dk |
| = | DASTI (Local Host) | Niels Gøtke | nigoe@fi.dk |

## Annex 3. Group distribution in Part 2: discussion session

**Cross-thematic aspects**

| Regionality | Scale and Chain | End-users | Open data access and standardization |
|---|---|---|---|
| *Moderator: Pablo Aller* | *Moderator: José M[a] García Alvarez Coque* | *Moderator: Isabelle Albouy* | *Moderator: Gabriela Pastori* |
| – Anne Vuylsteke<br>– Stephan Ropac<br>– Jan Svensson<br>– Jean-François Soussana<br>– Ophelie Hemonin | – Külli Kaare<br>– Monika Rzepecka<br>– Johannes Bender<br>– Lijbert Brussaard<br>– Alan Matthews<br>– Heather McKhann | – Stephan Lampel<br>– Huub Löffler<br>– Nicolas Tinois<br>– Dawn Howard<br>– Martin Koechy | – Gudrun Langthaler<br>– Maria Keuschnigg<br>– Peter Keet |

**Implementation matrix categories**

| Alignment | Emerging topics | New funding |
|---|---|---|
| *Moderator: Louis Fliervoet* | *Moderator: Nuria Durán* | *Moderator: Christine Bunthof* |
| – Marina Montedoro<br>– Andreas Aeschlimann<br>– Babette Breuer<br>– Tania Runge<br>– Richard Howell | – Yuval Eshdat<br>– Elfriede Fuhrmann<br>– Nastasia Belc<br>– Thomas Rosswall<br>– Kirsti Anker-Nilsen | – Paloma Melgarejo<br>– Annette Wijering<br>– Hartmut Stalb<br>– Mikko Peltonen<br>– John Roy Porter<br>– Theresa Ekong |

Observer: Herman Eijsackers

## Annex 4. Group distribution in the 'stickers session'

| | |
|---|---|
| **Policy AT** | Elfriede Fuhrmann & Stephan Ropac |
| **Policy BE** | Anne Vuylsteke |
| **Policy CH** | Andreas Aeschlimann |
| **Policy DE** | Hartmut Stalb |
| **Policy DK** | Niels Gøtke |
| **Policy EE** | Kulli Kaare |
| **Policy ES** | Paloma Melgarejo |
| **Policy FI** | Mikko Peltonen |
| **Policy FR** | Maurice Heral (not present, reasigned to Heather McKahn and Isabelle Albouy). |
| **Policy IE** | Richard Howell |
| **Policy IL** | Yuval Eshdat |
| **Policy IT** | Marina Montedoro |
| **Policy NL** | Annette Wijering, Huub Löffler & Herman Eijsackers |
| **Policy NO** | Gudrun Langthaler & Kirsti Anker-Nilsen |
| **Policy PL** | Monika Rzepecka |
| **Policy RO** | Natasia Belc |
| **Policy SE** | Jan Svensson |
| **Policy UK** | Theresa Ekong |
| **Science animal sector AN** | Dawn Howard & Peter Keet |
| **Science plant sector PL** | John Porter & Heather McKhann |
| **Science land-use sector LU** | Lijbert Brussaard & Thomas Rosswall |
| **Science socio-economic sector SE** | Jean-François Soussana & Martin Koechy |
| **Stakeholders farmers FA** | Tania Runge & Johannes Bender |
| **Stakeholders industry IN** | Babette Breuer |
| **Stakeholders consumers CO** | Alan Matthews & Maria Keuschnigg |

Pablo Aller, José Ma Álvarez Coque, Isabelle Albouy, Gabriela Pastori, Louis Fliervoet, Christine Bunthof, Nuria Durán, Nicolas Tinois and Ophelie Hemonin are not on the list as they made the summaries from the group discussions and other organisational tasks during the 'stickers session'.

## Annex 5. Complete set of tables from the desk study

***Table 1**: **Table 1**: Ranking of topics (A) and Core Themes (B) in 'Cat.1 alignment' of the Implementation Matrix according to the number of votes received*

| A) Ranking of topics (Cat.1) | | | | | B) Ranking Core Themes (Cat.1) | |
|---|---|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** | CT | **Total** |
| **2.1.2** | **14** | **4** | **2** | **20** | CT2 | 31 |
| **2.1.1** | **8** | **1** | **1** | **10** | CT4 | 16 |
| **4.1.2** | **5** | **2** | **1** | **8** | CT3 | 15 |
| **1.1.3** | **4** | **2** | **1** | **7** | CT1 | 9 |
| 3.1.1 | 4 | 2 | 0 | 6 | CT5 | 2 |
| 3.1.3 | 5 | 1 | 0 | 6 | | |
| 4.1.3 | 2 | 0 | 1 | 3 | | |
| 4.1.4 | 3 | 0 | 0 | 3 | | |
| 3.1.2 | 2 | 0 | 1 | 3 | | |
| 1.1.2 | 2 | 0 | 0 | 2 | | |
| 4.1.1 | 2 | 0 | 0 | 2 | | |
| 5.1.1 | 2 | 0 | 0 | 2 | | |
| EIP-2 | 1 | 0 | 0 | 1 | | |
| 1.1.1 | 0 | 0 | 0 | 0 | | |
| EIP-1 | 0 | 0 | 0 | 0 | | |
| | | | | 73 | | |

***Table 2**: Ranking of topics (A) and Core Themes (B) in 'Cat.2 emerging subjects' of the Implementation Matrix according to the number of votes received*

| A) Ranking of topics (Cat.2) | | | | | B) Ranking Core Themes (Cat.2) | |
|---|---|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** | CT | **Total** |
| **1.2.1** | **7** | **2** | **3** | **12** | CT1 | 37 |
| **4.2.3** | **11** | **1** | **0** | **12** | CT4 | 18 |
| 3.2.2 | 9 | 1 | 1 | 11 | CT3 | 14 |
| 1.2.3 | 9 | 0 | 1 | 10 | CT2 | 13 |
| 5.2.1 | 7 | 1 | 2 | 10 | CT5 | 10 |
| 1.2.2 | 4 | 4 | 0 | 8 | | |
| 1.2.4 | 6 | 1 | 0 | 7 | | |
| 2.2.2 | 5 | 1 | 1 | 7 | | |
| 2.2.1 | 4 | 1 | 1 | 6 | | |
| 4.2.2 | 2 | 1 | 1 | 4 | | |
| 3.2.1 | 1 | 1 | 1 | 3 | | |
| 4.2.1 | 2 | 0 | 0 | 2 | | |
| | | | | 92 | | |

***Table 3**: Ranking of topics (A) and Core Themes (B) in 'Cat.3 new funding topics' of the Implementation Matrix according to the number of votes received* [1]

| A) Ranking of topics (Cat.3) | | | | | B) Ranking Core Themes (Cat.3) | |
|---|---|---|---|---|---|---|
| **Topic** | Policy | Science | Stakeholders | **Total** | CT | **Total** |
| **1.3.3** | **13** | **0** | **2** | **15** | CT2 | 51 |
| **1.3.4** | **11** | **1** | **2** | **14** | CT1 | 47 |
| **4.3.7** | **10** | **1** | **1** | **12** | CT4 | 30 |
| **3.3.7** | **11** | **0** | **0** | **11** | CT3 | 29 |
| **2.3.8** | **10** | **0** | **0** | **10** | CT5 | 17 |
| 3.3.3 | 6 | 3 | 0 | 9 | | |
| 2.3.9 | 6 | 1 | 1 | 8 | | |
| 2.3.10 | 6 | 1 | 0 | 7 | | |
| 2.3.7 | 5 | 2 | 0 | 7 | | |
| 3.3.2 | 6 | 0 | 0 | 6 | | |
| 5.3.6 | 6 | 0 | 0 | 6 | | |
| 1.3.5 | 1 | 2 | 2 | 5 | | |
| 2.3.6 | 3 | 1 | 1 | 5 | | |
| 1.3.10 | 3 | 1 | 0 | 4 | | |
| 2.3.14 | 3 | 0 | 1 | 4 | | |
| 2.3.15 | 3 | 1 | 0 | 4 | | |
| 4.3.4 | 3 | 1 | 0 | 4 | | |
| 4.3.5 | 3 | 1 | 0 | 4 | | |
| 4.3.9 | 3 | 0 | 1 | 4 | | |
| 5.3.3 | 2 | 2 | 0 | 4 | | |
| 5.3.4 | 3 | 1 | 0 | 4 | | |
| 1.3.7 | 2 | 1 | 0 | 3 | | |
| 2.3.11 | 1 | 1 | 1 | 3 | | |
| 3.3.4 | 1 | 0 | 2 | 3 | | |
| 4.3.6 | 0 | 2 | 1 | 3 | | |
| 4.3.8 | 3 | 0 | 0 | 3 | | |
| 1.3.6 | 1 | 1 | 0 | 2 | | |
| 1.3.8 | 0 | 1 | 1 | 2 | | |
| 1.3.11 | 1 | 0 | 1 | 2 | | |
| 5.3.7 | 1 | 1 | 0 | 2 | | |
| 2.3.12 | 0 | 1 | 0 | 1 | | |
| 2.3.13 | 1 | 0 | 0 | 1 | | |
| 2.3.16 | 0 | 0 | 1 | 1 | | |
| 5.3.5 | 0 | 0 | 1 | 1 | | |
| 3.3.5 | 0 | 0 | 0 | 0 | | |
| 3.3.6 | 0 | 0 | 0 | 0 | | |
| 1.3.9 | 0 | 0 | 0 | 0 | | |
| 5.3.1 | 0 | 0 | 0 | 0 | | |
| | | | | **174** | | |

***Table 4**: Most voted topics of each Core Theme in 'Cat.3 new funding topics' of the Implementation Matrix[1].*

| | Ranking of topics per Core Theme (Cat.3) | | | | |
|---|---|---|---|---|---|
| | **Topic** | Policy | Science | Stakeholders | **Total** |
| **CT1** | **1.3.3** | **13** | **0** | **2** | **15** |
| | **1.3.4** | **11** | **1** | **2** | **14** |
| | 1.3.5 | 1 | 2 | 2 | 5 |
| | 1.3.10 | 3 | 1 | 0 | 4 |
| | 1.3.7 | 2 | 1 | 0 | 3 |
| | 1.3.6 | 1 | 1 | 0 | 2 |
| | 1.3.8 | 0 | 1 | 1 | 2 |
| | 1.3.11 | 1 | 0 | 1 | 2 |
| | 1.3.9 | 0 | 0 | 0 | 0 |
| | | | | | **47** |
| **CT2** | **2.3.8** | **10** | **0** | **0** | **10** |
| | **2.3.9** | **6** | **1** | **1** | **8** |
| | **2.3.10** | **6** | **1** | **0** | **7** |
| | **2.3.7** | **5** | **2** | **0** | **7** |
| | 2.3.6 | 3 | 1 | 1 | 5 |
| | 2.3.14 | 3 | 0 | 1 | 4 |
| | 2.3.15 | 3 | 1 | 0 | 4 |
| | 2.3.11 | 1 | 1 | 1 | 3 |
| | 2.3.12 | 0 | 1 | 0 | 1 |
| | 2.3.13 | 1 | 0 | 0 | 1 |
| | 2.3.16 | 0 | 0 | 1 | 1 |
| | | | | | **51** |
| **CT3** | 3.3.7 | 11 | 0 | 0 | **11** |
| | 3.3.3 | 6 | 3 | 0 | **9** |
| | 3.3.2 | 6 | 0 | 0 | **6** |
| | 3.3.4 | 1 | 0 | 2 | 3 |
| | 3.3.5 | 0 | 0 | 0 | 0 |
| | 3.3.6 | 0 | 0 | 0 | 0 |
| | | | | | **29** |
| **CT4** | **4.3.7** | **10** | **1** | **1** | **12** |
| | 4.3.4 | 3 | 1 | 0 | 4 |
| | 4.3.5 | 3 | 1 | 0 | 4 |
| | 4.3.9 | 3 | 0 | 1 | 4 |
| | 4.3.6 | 0 | 2 | 1 | 3 |
| | 4.3.8 | 3 | 0 | 0 | 3 |
| | | | | | **30** |
| **CT5** | **5.3.6** | **6** | **0** | **0** | **6** |
| | **5.3.3** | **2** | **2** | **0** | **4** |
| | **5.3.4** | **3** | **1** | **0** | **4** |
| | 5.3.7 | 1 | 1 | 0 | 2 |
| | 5.3.5 | 0 | 0 | 1 | 1 |
| | 5.3.1 | 0 | 0 | 0 | 0 |
| | | | | | **17** |

***Table 5**: Number of votes registered in the clusters of topics defined in "Cat.1 alignment" and "Cat.3 new funding topics" of the Implementation Matrix* [1]

| Clusters (Cat.3 + Cat.1) | | |
|---|---|---|
| **Cluster** | Topic | **Total (Cat.3 + Cat.1)** |
| Resilience | 2.3.8 | 22 + 20 |
| | 2.3.9 | |
| | 4.3.4 | |
| | 2.1.2 | |
| Protein | 1.3.4 | 20 |
| | 1.3.8 | |
| | 1.3.9 | |
| | 1.3.10 | |
| Soil | 3.3.7 | 15 + 10 |
| | 3.3.6 | |
| | 4.3.9 | |
| | 2.1.1 | |
| Natural resources | 2.3.15 | 16 + 2 |
| | 4.3.7 | |
| | 1.1.2 | |

***Table 6**: Northern Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking Topics Northern Europe DK, FI, NO, SE (Cat.3) | | | B) Ranking Core Themes N (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **1.3.3** | **3** | **A** | CT1 | 9 |
| **1.3.4** | **3** | | CT2 | 7 |
| **3.3.3** | **3** | | | |
| **3.3.7** | **3** | | | |
| 2.3.7 | 2 | **B** | | |
| 2.3.10 | 2 | | | |
| 4.3.8 | 2 | | | |
| 5.3.6 | 2 | | | |
| 1.3.5 | 1 | **X** | | |
| 1.3.7 | 1 | | | |
| 1.3.10 | 1 | | | |
| 2.3.6 | 1 | | | |
| 2.3.8 | 1 | | | |
| 2.3.13 | 1 | | | |
| 4.3.7 | 1 | | | |
| ERA-NETs | 1 | | | |
| | **28** | | | |

***Table 7**: Eastern Central Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topics Eastern Central Europe AT, EE, PL, RO (Cat.3) | | | B) Ranking Core Themes E-C (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **3.3.7** | **4** | **A** | CT2 | 7 |
| 1.3.4 | 3 | **B** | CT1 | 6 |
| 1.3.3 | 2 | **C** | CT3 | 6 |
| 2.3.6 | 2 | | | |
| 2.3.9 | 2 | | | |
| 3.3.2 | 2 | | | |
| 4.3.7 | 2 | | | |
| 5.3.6 | 2 | | | |
| 1.3.11 | 1 | **X** | | |
| 2.3.8 | 1 | | | |
| 2.3.14 | 1 | | | |
| 2.3.15 | 1 | | | |
| 4.3.9 | 1 | | | |
| 5.3.3 | 1 | | | |
| 5.3.7 | 1 | | | |
| PL used only 5 votes | **26** | | | |

***Table 8**: Western Central Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topics Western Central Europe BE, CH, DE, FR, IE, NL, UK (Cat.3) | | | B) Ranking Core Themes W-C (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **1.3.3** | **6** | **A** | CT1 | 14 |
| 1.3.4 | 4 | **B** | CT2 | 12 |
| 2.3.8 | 4 | | | |
| 4.3.7 | 4 | | | |
| 3.3.2 | 3 | **C** | | |
| 3.3.3 | 3 | | | |
| 3.3.7 | 3 | | | |
| 1.3.10 | 2 | **X** | | |
| 2.3.7 | 2 | | | |
| 2.3.9 | 2 | | | |
| 2.3.10 | 2 | | | |
| 4.3.9 | 2 | | | |
| 5.3.4 | 2 | | | |
| 1.3.6 | 1 | **X** | | |
| 1.3.7 | 1 | | | |
| 2.3.11 | 1 | | | |
| 2.3.15 | 1 | | | |
| 4.3.4 | 1 | | | |
| 4.3.5 | 1 | | | |
| 4.3.8 | 1 | | | |
| 5.3.3 | 1 | | | |
| 5.3.6 | 1 | | | |
| ERA-NETs | 1 | | | |
| | **49** | | | |

***Table 9**: Southern Europe countries: most voted topics (A) and Core Themes (B) in "Cat.3 new funding topics" of the Implementation Matrix* [1]

| A) Ranking topicsSouthern Europe IL, ES, IT, TR (Cat.3) | | | B) Ranking Core Themes S (Cat.3) | |
|---|---|---|---|---|
| **Topic** | **Total** | **Level** | **CT** | **Total** |
| **2.3.8** | **4** | **A** | CT2 | 12 |
| 4.3.7 | 3 | **B** | CT4 | 7 |
| 1.3.3 | 2 | **C** | | |
| 2.3.9 | 2 | | | |
| 2.3.10 | 2 | | | |
| 2.3.14 | 2 | | | |
| 4.3.4 | 2 | | | |
| 4.3.5 | 2 | | | |
| 1.3.4 | 1 | **X** | | |
| 2.3.7 | 1 | | | |
| 2.3.15 | 1 | | | |
| 3.3.2 | 1 | | | |
| 3.3.4 | 1 | | | |
| 3.3.7 | 1 | | | |
| 5.3.4 | 1 | | | |
| 5.3.6 | 1 | | | |
| ERA-NETs | 1 | | | |
| | **28** | | | |

***Table 10**: Comparison of the A level topics of each European region (N, Northern; E-C, Eastern Central; W-C, Western Central and; S, Southern) 'Cat.3 new funding topics'* [1]

| Comparison of "A" level topics (Cat.3) | | |
|---|---|---|
| **Topic** | **Region** | **Level** |
| **1.3.3** | N | **A** |
| | E-C | **C** |
| | W-C | **A** |
| | S | **C** |
| **3.3.7** | N | **A** |
| | E-C | **A** |
| | W-C | **C** |
| | S | **X** |
| **2.3.8** | N | **X** |
| | E-C | **X** |
| | W-C | **B** |
| | S | **A** |
| **1.3.4** | N | **A** |
| | E-C | **B** |
| | W-C | **B** |
| | S | **X** |
| **3.3.3** | N | **A** |
| | E-C | **X** |
| | W-C | **C** |
| | S | **X** |

## Annex 6. Implementation Matrix and indications of support

Posters were prepared by the organisers to facilitate discussion and prioritization needed to develop a feasible road map. The posters show the Implementation Matrix, with topics under the core research themes ordered in three categories (Cat 1 Mature research; Cat 2 Emerging Research; Cat 3 topics that need common European effort and developing research), and within Category 3 the division into the instruments (i) collaborative research; (ii) ERA-NETs; (iii) Infrastructures. The topics and categorization are developed through an inclusive process of FACCE-JPI. The source for the text used in the meeting is the Draft First Biennial Implementation Plan 2014-2015 (the version sent for the GB meeting on June 25).

The following text was printed as a legend in the heading of each of the posters.

**GB, SAB AND StAB INPUTS INTO priority actions based on SRA and outcomes of Mapping Meetings**

Numbers do not indicate priorities. Topics in green are on-going or planned as FACCE implementation actions. Year of launching indicated for alignment actions (on-going and proposed) and for scoping actions (proposed)

At the meeting some topics were highlighted to indicate consensus advice from the discussion groups and the delegates put stickers to express indications of support for topics.

These outcomes are shown, added to the original poster text, in the tables on the next pages. For the group that discussed on Cat 1 (alignment topics) pink highlight is used, for the group that discussed on Cat 2 (collaborative research) yellow highlight is used.

After each topic there is line '*BBCM Indications of priority*' which lists the indications of support as given in the BBCM. In blue Policy_Country, in green Science_Sectors, in orange Stakeholders_interest groups.

Suggestions for changes of the text of some of the topics have been listed in section 3.1.2 of this report.

# Core theme 1 Sustainable food security under climate change

## Cat 1. **Mature Research**
## ⇨Alignment instruments

including areas where research is scattered
⇨ alignment at geographic or thematic level

**1.1.1 Knowledge Hub. Modeling effect of climate change on agriculture (MACSUR) (2011)**

**1.1.2 International call on Food Security and Land Use Change (Belmont Forum) (2013)**
*BBCM Indications of priority*: **IL, XX**
XX: somebody asked for a new sticker as one of their round stickers was lost. I do not remember who shet was, and on the sticker (blue round) there is no country code written.

**1.1.3 Knowledge Hub**. Network of **experimental climate change studies** on crop and grassland systems. This would potentially include all temperature (heat and cold), water (drought and logging) ozone and elevated $CO_2$ manipulation experiments. The key need is to create a strong and open **data base**. This network would complement ANAEE (which has a small number of key infrastructures) and MACSUR (which places its main efforts on modeling) and deliver a data base of experimental climate change studies in Europe (in collaboration with existing initiatives). (2015)
*BBCM Indications of priority*: **AT, DE, ES, FR, LU, SE, FA**

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_Collaborative projects

1.3.3 Cost effective approaches to **reducing food waste and by-products** (throughout the production chain e.g. post-harvest losses and food exceeding shelf life of products, consumer habits, food safety) in climate smart and sustainable food chains processes (plant and animal- based).
Strategies and technologies suitable for a more sustainable production; strategies and technologies to increase shelf life of products, including the development of new processing, preservation and packaging logistic systems; novel approaches for accurate determination of product shelf life; strategies and technologies to reduce spoilage, better use of waste, including at the consumer level.
*Link with EIP Agricultural Productivity and Sustainability (Resource efficiency and Sustainable consumption and supply chain)*
*Priority: IPWG*
*BBCM Indications of priority*: **AT, CH, DE, FI, FR, IE, IT, NL, NO, RO, SE, UK, TR IN, CO**

1.3.4 Reducing the **protein dependency of European agriculture** through increased production of grain and forage legumes in Europe, improved high quality plant based protein sources, increased feed use of food by-products and enhanced transformation for animal and human consumption. (Bioeconomy) **Link with EIP Agricultural Productivity and Sustainability (Resource efficiency)**
*Priority: IPWG, Plant ETP: Support TP O* *BBCM Indications of priority*: **NL, FR, DK, ES, DE, EE, FI, NO, PL, RO, BE PL FA, FA**

1.3.5 Analysis of coherence/conflicts in **policy instruments and regulatory measures** in Europe (synergy and competition between EU regulations for food systems and the environment and their implications for global and European food security) in the context of climate change. *This may require a CSA to synthesize results of past projects*
*BBCM Indications of priority*: **FI SE, LU FA, CO**

1.3.6 Research to support **policy developments** towards information/regulation that impacts on **consumer choices and behaviours** (e.g. climate smart food labels, potential of short-supply chains as a way to engage consumers, how access/affordability to high-quality food can be influenced through market and policy measures). Consumer attitudes toward food sustainability, acceptability of food and non-food innovations, incentives through public policies and private strategies (simulation, evaluation ex-ante). Impact of ICT technologies to make the smart choice the easy choice.
*BBCM Indications of priority*: **UK CO**

1.3.7 **Exploring trade-offs and synergies between GHG mitigation, climate change adaptation and global food security and international trade**. Which world regions and which systems have the best mitigation & adaptation potentials? How do these relate to European regions? What will be the indirect impacts of climate change on Europe through trade and economics?
*BBCM Indications of priority*: **DE, SE, LU**

1.3.8 **Shift in demand from animal to plant proteins in European countries**. Scenarios to be explored for 2020's and beyond assuming that nutritional recommendations are matched with less animal proteins. Effects on the whole sector, both environmentally (GHG mitigation), socially and economically to be assessed including demands on food industries to develop attractive plant based products and changes in ag. systems. Impact on the nutritional status of at risk populations, especially aging and sick populations. *BBCM Indications of priority*: **SE CO**

1.3.9 **Impact of diets on GHG and environment; simulations of evolutions.**
*BBCM Indications of priority*:

**1.3.10 Increasing production sustainably from Europe's grassland resources.** Europe has significant areas of grassland which contribute to carbon sequestration. These grasslands need to contribute to increased food security (particularly animal **protein requirements) whilst maintaining their carbon sequestration potential**. How can production be increased from extensive and intensively managed grasslands in a sustainable manner?
*BBCM Indications of priority*: **CH, IE, NO AN**

1.3.11 **Urban agriculture** that combines the aims of production and social policy targets such as education, social cohesion, care farms.
*BBCM Indications of priority*: **AT CO**

Protein programme

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_ERA-NETs

1.3.1 EXISTING **SUSFOOD ERA-NET. Sustainable food production and consumption.** Targeted collaboration on the GHG balance of food systems and on post-farm gate mitigation and adaptation.
*BBCM Indications of priority*: **DK**

1.3.2 NEW **ERA-NET: Increasing the resilience of regional agrifood systems in Europe to climate variability and food price volatility (e.g. regional agricultural systems and their risk patterns, their resilience, including socio-economics, farmers and industry strategies)** ***(check links with climate smart ERA-Net. Note that this is an overarching topic which is expected to stimulate the development of integrated approaches)***
*BBCM Indications of priority*: **AT LU**

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_Infrastructures

## Cat 2. **Emerging subjects**
## ⇨Scoping instruments (dialog with stakeholders, inputs to Cat 3)

1.2.**1 Methods for better integrating research on food economics** (prices, drivers, trade, markets, etc.) and climate change (e.g. food market price volatility and its relation with climate change) *(scoping input for 1.3.1)* (2014)
*Support of IPWG*
*BBCM Indications of priority*: **FI, ES, NL, BE, IT, IE, TR PL, LU FA, IN, CO**

1.2.2 **Exploring high end climate change scenarios (e.g. +3 to +6°C).** Long-term risks of climate change and climatic variability (increasing severity and frequency of extreme events) on agriculture, aquaculture and food security in Europe. (2014)
*BBCM Indications of priority*: **FR, IT, ES, ES, AN, LU, SE, SE**

1.2.3 **Food safety implications of climate change and climate extremes.** Climate change leads to new hazards in the entire supply chain, including agriculture. This will require new knowledge to maintain the high standards and safety of European food. (2015)
*BBCM Indications of priority*: **CH, EE, DK, IL, IE , IT, RO, TR, UK CO**

1.2.4. Assessing **multi-output/multifunctional agriculture (i.e. land sharing)** versus agricultural intensification (i.e. land sparing) **under climate change** and climate extremes: resilience and food security implications. (2015)
*Support of IPWG*
*BBCM Indications of priority*: **DK, SE, NO, RO, TR, UK LU**

## Core theme 2 Environmentally sustainable growth and intensification of agricultural systems

### Cat 1. **Mature Research**
### ⇨Alignment instruments

including areas where research is scattered
⇨ alignment at geographic or thematic level

2.1.1 **Agricultural soil restoration Knowledge Hub**. Developing novel methods for restoring organic matter in agricultural soils, reduce erosion and increase soil quality by reducing organic pollutants and heavy metals (e.g. by increasing soil biological activity, through conservation agriculture, crop and grassland rotations, mulch and composts, buffer strips, phytoremediation, etc…). Collaboration with JRC and with FAO, with Snowman network. (2014)
*Of interest to Plant ETP, support of IPWG, TP O*
*BBCM Indications of priority*: highlighted by discussion group consensus
**AT, FR, IT, CH, IE, EE, NL, TR AN FA**

2.1.2 **Sustainable intensification of major European crop and livestock systems** Combined development of breeding (and multiplication of locally adapted seeds and breeds), plant/animal health, agro-ecological engineering, precision farming, ecotechnologies and biotechnologies for increased environmental sustainability, increased feed efficiency, resource efficiency & conservation, productivity and competitiveness in the context of climate change *(Link to agricultural EIP. Coordinate efforts across countries with support through long-term funding of > 4 years. Knowledge networks, possibly combined later within a single knowledge hub)*
Research should not only target major crops, but also minor crops to favour crop diversification opportunities. (2015)
*Priority: Plant ETP; Support of IPWG*
*BBCM Indications of priority*: highlighted by discussion group consensus
**BE, CH, DK, UK, SE, IL, IT, IE, SE, FI, RO, NL,NO, TR PL, AN (2x), SE, IN, CO**

**Collaboration with EIP** (not funded by FACCE) *Research and Innovation Board on environmentally sustainable growth and intensification of agricultural systems. This would be an ongoing discussion and dissemination activity looking at major projects funded at European or Member States levels, to discuss the additional steps needed until it can actually be implemented at the farm level. It could be run by the relevant ETPs to identify, if towards the end of the projects, further basic research or applied research or knowledge transfer or which measures in the innovation framework would be needed to make sure that all projects lead to their implementation at farm level.(2014)*
*BBCM Indications of priority*:

**Collaboration with EIP** (not funded by FACCE) *Facilitating extension services across Europe to bring the knowledge to the farmers and to give feedbacks from the farmers to the researchers. The implementation would be mainly via the CAP but the link up at the European level should be done via the Horizon programme. For the European component, relevant ETPs could take the lead.(2015)*
*BBCM Indications of priority*: **DK**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Collaborative projects

2.3.6 **Bioeconomy socio-economics**. New analytical and transectorial models across value chains including tools for spatial disaggregation and consumer values. Barriers to implementation. Opportunities for job creation, SMEs… *BBCM Indications of priority*: **EE, PL, SE, SE IN**

2.3.7 Benchmarking **yield gaps**, **production and quality losses** across Europe in terms of Genotype x Environment x Management interactions and of resource (water, nutrients) efficiencies (address interactions with climate change, cropping systems and socio-economic barriers). This could start with a single crop (e.g. wheat which displays stagnating yields), but could also be address more crops.
*Priority: Plant ETP BBCM Indications of priority*: **NL, IT, FI, DE, DK, PL(2x)**

2.3.8 Breeding for **disease resistant crop genotypes adapted to local conditions and deploying resistance genes** in landscapes and European regions to maximize their efficiency and their lifespan. Special attention will be paid to emerging plant diseases in the context of climate change. Link with multi-actor project under EIP, e.g. for on-farm-bred varieties
*Priority: IPWG, Plant ETP BBCM Indications of priority*: **FR, ES, DE, AT, IL, NO, UK, BE, TR(2x)**

2.3.9 **Developing novel vaccination methods and breeding for robustness ( to infectious diseases in livestock and aquaculture species**. See also 2.12. Special attention will be paid to emerging animal diseases in the context of climate change. *BBCM Indications of priority*: **FR, IT, NL, RO, IL, PL AN FA**
highlighted by discussion group consensus

Resilience programme

2.3.10 Developing integrated **crop- livestock-renewable energy** systems, including aquaculture production as well as the recycling of animal wastes (e.g. through algae), of green wastes and the provision of renewable energy generation (e.g. biogas, heat ) and assessing their sustainability and competitivity. This also includes assessing the (geographical) scale and local systems organisation, and new business models for different regions. (Link with COFASP ERA-Net)
*BBCM Indications of priority*: **UK, IE, IT, SE, NO, TR LU**

2.3.11 **Efficiency animal feed chains.** Create new opportunities to improve the efficiency of feed chains by optimising the quantity of feed available for the animal, reducing losses, better use of local resources and creating new feed chains of alternative feed resources and by-products of the food chain, thereby reducing waste. *BBCM Indications of priority*: **IE AN IN**

2.3.12 **Epidemiological monitoring** (e.g. early warning systems, on farm detection/diagnostic tools ) for early detection, control and eradication of animal and plant diseases/emerging risks. This includes image analysis, and geolocalization technologies (see also 4.1.2 which is more on adaptation)
*BBCM Indications of priority*: **AN**

2.3.13 **New instruments and new sensors** for agricultural productivity and food quality (e.g. agricultural engineering, horticulture, plant and animal phenotyping under climate change, food processing) and for environmental quality (e.g. water, soil and air quality in agricultural landscapes).
*Priority: IPWG, Plant ETP*
*BBCM Indications of priority*: **DK**

2.3.14 **Food safety risks, food traceability and environmental quality in the bioeconomy:** integrated studies of emerging risks from biotic and abiotic agents in agricultural/bioeconomy systems especially those recycling organic wastes and waste waters. Reducing potentially harmful molecules in food supply chains, such as microbial pathogens, heavy metals, mycotoxins, biogenic amines, neurotoxins and other organic compounds, as well as the persistent contaminants (dioxins, PCBs, PFOs and PFOA, PBDE, etc). The corresponding risks will be assessed in the context of climate change.
*BBCM Indications of priority*: **EE, IL, TR CO**

2.3.15 **Nitrogen and phosphorus losses to the aquatic environment**. Development of new approaches (measurements, modeling, data integration) to assess new systems at field, farm, landscape and catchments scales for reducing nutrient loadings to surface waters (streams, lakes, marine environments) that cope with the changes in loss pathways and nutrient transformation processes as affect by climate change and climatic extremes. *BBCM Indications of priority*: **AT, DE, ES, AN**

2.3.16 **Agricultural systems for production near metropoles** (local food production), in particular horticulture to supply citizens with vegetables.
*BBCM Indications of priority*: **CO**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_ERA-NETs

2.3.1 EXISTING **Core-Organic III, Organic Agriculture ERA-NET.** Reducing the environmental effects of organic agriculture throughout the value chain and also Functional biodiversity to improve management of pests and diseases and Plant/Soil Interaction. FACCE – JPI and CO will exchange on it might be possible to have a joint call. (Link through to CT4 and CT5)
*BBCM Indications of priority*: **AT**

2.3.2 EXISTING **Precision agriculture and ICT ERA-NET.** Targeted collaboration on crop diversification, crop mixtures, multi-component agriculture, and adaptation of inputs to climatic variability and to GHG mitigation goals. *BBCM Indications of priority*:

2.3.3 EXISTING **IPM, Integrated Pest Management ERA-NET.** Targeted collaboration on emerging pests and diseases and on climate change adaptation of IPM strategies. (Link through to CT4)
*BBCM Indications of priority*: **AT**

2.3.4 EXISTING **ERA-CAPS, Advanced plant sciences.** Targeted collaboration on drought, heat and salt tolerance of crop and pasture species, on root symbioses and on primary productivity adaptation to elevated $CO_2$. (Link through to CT4) *BBCM Indications of priority*: **LU**

2.3.5 NEW **ERA-NET: Sustainable bioeconomy supply chains.** Integrated approaches to overcome current barriers in bioeconomy supply chains and sustainably produce bioenergy and biomaterials while maintaining food production and increasing soil/biomass carbon stocks through the development of innovative knowledge intensive farming systems and land management at landscape to regional scales. Such systems combine food, feed, bioenergy and biobased products, recycling organic wastes, residues from agricultural production and producing and processing bioresources for industries. Special attention will be paid to GHG mitigation vs. fossil fuel substitution, to indirect land use change impacts and to climate change adaptation. *BBCM Indications of priority*: **IE**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Infrastructures

2.3.17 NEW **Infrastructure (I3)**. Conservation and use of **plant genetic resources** (including wild plant relatives). Access to genetic resources and (meta)data. Link through to CT4, preserving the genetic potential for adaptation.*Priority: Plant ETP BBCM Indications of priority*:

2.3.18 NEW **Infrastructure (I3)**. Conservation and use of **animal genetic resources** also to enlarge the basis of adaptation to climate change. Access to genetic resources and to (meta)data. Link through to CT4, preserving the genetic potential for adaptation. *BBCM Indications of priority*: **AN**

2.3.19 NEW **Infrastructure**. Monitoring **water availability and quality for agriculture at river basin level (link through to CT4 adaptation)**. Such an infrastructure would have a high added value at EU scale to monitor changes in water resources as affected by climate change and by agriculture. Decision support tools for farmers in catchment areas will be developed. *See also Water JPI, no overlap with ANAEE BBCM Indications of priority*:

### Cat 2. **Emerging subjects**
### ⇨Scoping instruments (dialog with stakeholders, inputs to Cat 3)

2.2.1 Increasing the interactions between environmental sciences, ecology, social sciences and the agricultural science community through joint **FACCE JPI sessions/workshops (e.g. of European scientific societies).** (2014) *Priority: Plant ETP; Important Copa-Cogeca*
*BBCM Indications of priority*: **IE, IL, FI, SE SE FA**

2.2.2 How to create synergies and overcome barriers to **crop diversification**? Markets, breeding, machinery investments, behavioural attitudes of farmers, farm advisors, environmental organisations, researchers, government agencies and industries. (Link to 2.1.2) (2015)
*Of interest to Plant ETP*
*BBCM Indications of priority*: **BE, DE, DK, EE, IT PL FA**

## Core theme 3 Assessing and reducing trade-offs between food production, biodiversity and ecosystem services

### Cat 1. **Mature Research**
### ⇨Alignment instruments

including areas where research is scattered
⇨ alignment at geographic or thematic level

3.1.1 **Knowledge Hub.** Develop and standardize **methods for assessing and monitoring biodiversity and ecosystem services** within agricultural landscapes across Europe under different scenarios and how to link these to productivity and resource use efficiency, and who provides and gets rewarded for these services (by society and economically). Synthesis with a focus on land sharing and land sparing at a range of spatial scales. (2014)
*BBCM Indications of priority*: highlighted by discussion group consensus
**NL, FR, CH, IE PL, LU**

3.1.2 **Regional Hubs.** Optimizing the use of resources (water, land, energy, nutrients and outputs) and ecosystem services through the use of biodiversity in regional farming systems. Link with EIP on thematic networks, operational groups. (2014)
*BBCM Indications of priority*: **ES, RO CO**

3.1.3 **Large scale farm data bases.** Regional networks (e.g. data collections and data sharing) of experimental farms and agricultural practices along a large spatial gradient in Europe and over a long time scale (link through to CT2 and CT4). To be designed with JRC (see CAPRI and the FADN network). Involve scientists, policy makers and farmers in the design (collaboration with EIP Thematic networks with regional operational groups). FACCE to focus on open data architecture and use for modeling. (2015)
*BBCM Indications of priority*: **BE, DE, EE, FI, SE SE**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Collaborative projects

3.3.2 **Improvement and restoration of the pollination service** (from bees and wild pollinators) in European farming landscapes. Including landscape management, ecotoxicology, genetics and breeding of bees, ecology of wild pollinator species.
*Priority: IPWG*
*BBCM Indications of priority*: **IT, BE, EE, AT, FR, CH**

3.3.3 **Integrated measurement and modelling of ecosystem services and their values** in agricultural landscapes and assessment of the role of agri-environmental measures. This includes exploiting the adaptive capacity of herbivores in marginal grazing lands and associated services.
*BBCM Indications of priority*: highlighted by discussion group consensus
**CH, FI, DK, SE, UK, NL PL, LU, SE**

3.3.4 **Legume rotations and intercropping – mixed cultivation systems** with e.g. cereals; mixed cultivation of several varieties of one crop (EU and global dimension) including use of plant genetic resources and breeding for inter-cropping. This would include a better exploitation of legumes to improve resource use efficiency in grassland systems. (Link with EIP networks)
*BBCM Indications of priority*: **ES FA, IN**

3.3.5 **Multi-component agriculture** (e.g. agroforestry, multi-component agricultural landscapes effective grazing strategies), including socio-economics and legal aspects and links with ecosystem services. (Link with EIP networks)
*BBCM Indications of priority*:

3.3.6 **Developing root symbioses** in European farming systems. Research and novel technologies concerning N fixing symbioses and mycorhizae, including inoculation and use of rhizosphere signalling technologies.

3.3.7 **Soil, the last frontier**. Functional soil microbiology for productivity and nutrient cycling. Plant symbiotic micro-organisms in the rhizosphere beneficial for plant health and plant growth.
*Priority: IPWG*

*BBCM Indications of priority*: highlighted by discussion group consensus Soil Programme combining these two topics and 2.1.1 and 4.3.9
**AT, BE, DK, EE, ES, IE, FI, PL, NL, NO, RO**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_ERA-NETs

3.3.1 EXISTING **ERA-NET BiodivERsA 2.** Targeted collaboration on biodiversity and agriculture =>
**3.3.1 Possible Joint call on ecosystem services in agricultural systems with BiodivERsA ERA-Net**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Infrastructures

3.3.8 EXISTING **Infrastructure. ANAEE (see www.anaee.com)**

### Cat 2. **Emerging subjects**
### ⇨Scoping instruments (dialog with stakeholders, inputs to Cat 3)

3.2.1 **Training on functional biodiversity.** Develop a programme for young scientists to train them on integrated approaches to functional biodiversity in an interdisciplinary context.
(Training workshop) (2014)
*BBCM Indications of priority*: **NL, LU, FA**

3.2.2 Enhancing the appreciation of **trade-offs across ecosystem services** at farm level and their economic effects at farm level (including agri-environmental schemes). (2015)
*BBCM Indications of priority*: **BE, CH, SE, UK, NO, DE, EE, FR, RO, PL, IN**

*NOTE : Support of TP O for all topics of CT3*

# Core theme 4 Adaptation to climate change

## Cat 1. **Mature Research**
## ⇨Alignment instruments

including areas where research is scattered
⇨ alignment at geographic or thematic level

4.1.1 **Knowledge hub on plant phenology** under climate change (arable crops, fruit trees, vine, grasslands…). Phenology change is key to plant adaptation and needs to be monitored at sites equipped with weather stations. (2015)
*Priority: Plant ETP*
*BBCM Indications of priority*: **FI, SE**

4.1.2 **Knowledge hub on plant epidemiology under climate change**, concerning emerging pests and diseases. *This would complement the C-IPM ERA-Net. The intention is to strengthen existing data infrastructures and to develop participatory research (e.g. using smart phones and interactive tools to assess diseases and geo-localise damages), as well as epidemiological modeling. Collaboration with EIP can be sought (see also 2.3.11).* (2015)
*Priority: Plant ETP*
*BBCM Indications of priority*: highlighted by discussion group consensus with remark **+ ANIMALS** **NO, ES, DK, AT, IL, PL, LU, IN**

4.1.3 **Limits to adaptation of farmer's practices to a changing climate** (e.g. why do sowing dates not change as expected from warming?). *This could be a **collaboration with EIP** (JPI would organise a European data set).*(2015)
*BBCM Indications of priority*: **BE, IT, FA**

**4.1.4. Create, extend wheat phenotyping network under climate change** (currently **3 countries** have infrastructures: Italy, Germany and France) and free-air studies of $CO_2$, heat and drought on wheat. Assessing ground-breaking designs for improving wheat productivity under climate change (*A **Knowledge Hub** could be formed. It may also be gradually extended to other field crops, including perennial and horticultural species and grasslands). This is more specialized than the plant phenotyping infrastructure which is also suggested in category 3. Collaboration foreseen with e.g. Australia.* (2014)
*Priority: Plant ETP*
*BBCM Indications of priority*: **UK, RO, TR**

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_Collaborative projects

4.3.4 **Adaptation in livestock (and aquaculture) to heat.** Breeding (and phenotyping) for thermal tolerance in aquaculture, dairy, pig and poultry and designing heat and climate extremes compatible farm buildings and animal feeding/watering strategies. Interactions with enteric methane (see CT5) and animal feed conversion efficiencies need to be studied and improved by combining nutrition, genetics, health and management and housing aspects (precision livestock farming). *(see also Climate Smart ERA-Net; target here transferrable technologies and include private companies). Note that aquaculture is a different area which may require a separate project.*
*Priority: IPWG*
*BBCM Indications of priority*: highlighted by discussion group consensus **to be linked in resilience cluster** **IT, IL, CH AN**

4.3.5 **Crop adaptation to elevated $CO_2$ in interaction with drought and heat** based on prior results obtained with model species and a few crop species; varieties and breeding *(see also Climate Smart ERA-Net; this collaborative project would target transferrable technologies and include private companies)*
*BBCM Indications of priority*: **FR, IL, TR PL**

4.3.6 **Seasonal forecasting of extreme weather events (e.g. droughts, heat waves)** and their impacts on agriculture, land management and water resources. Recent progress has been made in drought/heat projections and this can be improved by combination of remote sensing (SMOS, Sentinel 2.0 satellites, GRACE) and modelling. *A theme to be further explored with ECMWF, with JRC and possibly with the Climate and Water JPIs.*
*BBCM Indications of priority*: **PL, SE IN**

4.3.7 **Precision water management in crop production at farm and catchment scales**. Assess the potential for water savings in European agriculture combining improved irrigation infrastructures and technologies, deficit irrigation, water reuse, sensors and remote sensing, ICT and changes in crop (livestock) genotypes/species (farm and landscape level). (Link with Climate KIC). Provide a roadmap for improved water efficiency by European agriculture (possible link with EIP and with JPI Water).
*Priority: IPWG*
*BBCM Indications of priority*: highlighted by discussion group consensus fit under a broader resource efficiency joint actions line
**NL, DE, RO, ES, DK, BE, IL, PL, UK, TR FA IN**

4.3.8 **Forests adaptation.** Adapting forest management regeneration to maintain the carbon sink and the productivity of European forests under climate change (tree genetics, novel tree species, designing adapted mixed forests, controlled 'tree migration'). Note: Adaptation and mitigation for forests is part of the SRA and is also a pre-requisite for the bioeconomy strategy. Link to forestry ERA-Nets (which do not deal explicitly with CC adaptation).
*BBCM Indications of priority*: **FR, SE, FI**

4.3.9 **The role of soils for climate change adaptation**. More information is needed on the role of soils and soil management for supporting climate change adaptation, in particular related to water harvesting and crop water and nutrient supply.
*BBCM Indications of priority*: **CH, AT, UK FA**

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_ERA-NETs

4.3.1 EXISTING ERA-NET **ANIHWA, Animal Health and emerging diseases, ANIHWA+ (future ERA-Net under H2020).** Emerging animal diseases in link with climate change.
*BBCM Indications of priority*: **AT AN**

4.3.2 EXISTING ERA-NET **ARIMNET 2, Mediterranean agriculture.** Will exchange with FACCE in planning next call (climate change adaptation of Mediterranean agriculture).
*BBCM Indications of priority*: **IL**

4.3.3 **FACCE ERA-NET Plus. Climate Smart Agriculture**
- Breeding (see also 2.3.7)
- Pests & diseases
- Adaptive water and soil management
- Assessing options for increasing agricultural systems resilience:
- Relocating production systems and associated infrastructures:
- Socio-economic issues are cross-cutting

## Cat 3. **Need common European effort and developing research**
## ⇨Funding instruments_Infrastructures

**See 3.3.7 ANAEE (already under negotiation).**
For adaptation, need to emphasize **the inter-operability of ANAEE across countries**. For instance, monolith (i.e. intact soil blocks) transplant experiments for arable field crops and grasslands across sites (using e.g. a lysimeter design and elevated $CO_2$ through mini-FACE across the site network of ANAEE) would provide a novel understanding of the impacts of climate (space for time analogue is provided by transplantation) and its interaction with $CO_2$. This understanding is still lacking and is crucial for assessing impacts and adaptation.

## Cat 2. **Emerging subjects**
## ⇨Scoping instruments (dialog with stakeholders, inputs to Cat 3)

4.2.1 **Tactical (short term) risk management for climate variability in agriculture** (i.e. systems to help and support farms in deciding e.g. in which technology to invest and how to cope with climate hazards). (2015)
*BBCM Indications of priority*: **BE, DE**

4.2.2 **Assessment of the potential of perennial field crop species** for climate change adaptation in temperate agriculture. (2014)
*BBCM Indications of priority*: **IL, TR PL IN**

4.2.3: **Animal health/animal diseases and GHG mitigation.** Link through to CT5. If a link could be drawn between animal health status and greenhouse gas emissions intensity it would be useful. There are significant bodies of ongoing research in the fields of animal health and in GHG emissions but facilitating links and synergies between the two could be particularly beneficial for GHG mitigation (link with GRA). (2014)
*Support of IPWG*
*BBCM Indications of priority*: **ES, NO, PL, FR, SE, IL, FI, IE, UK, DK, CH AN**

## Core theme 5 Greenhouse gas mitigation

### Cat 1. **Mature Research**
### ⇨Alignment instruments

including areas where research is scattered
⇨ alignment at geographic or thematic level

5.1.1 **European data base of detailed GHG emission coefficients** from agriculture (a contribution to the improvement of national inventories, i.e. Tier2). (Links with GRA). (2014)
*BBCM Indications of priority*: **NO, EE**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Collaborative projects

**5.3.1 International call on agricultural greenhouse gas**

5.3.3 Studies **on innovative monitoring and verification methods** (e.g. new measurement methods of soil carbon stocks, etc…) for greenhouse gas emissions, carbon sequestration and nitrogen cycling (more specific than 2.3.7).
*BBCM Indications of priority*: **BE, EE, PL, SE**

5.3.4 **Cattle breeding for reduced methane emissions** – linked to animal phenotyping and genotyping. Interactions with feeding strategies (including grazing) by improving the feed conversion rate. (Link with non EU participants, e.g. NZ). (Distinct but connected to 4.3.5)
*Priority: IPWG*
*BBCM Indications of priority*: **CH, IE, IT, AN**

5.3.5 $N_2O$ mitigation and carbon sequestration through **changes in root architecture and in rhizosphere exudates** (e.g. Brachialactone already transferred to rice), potential of breeding and transfer to grain crops and forage species.
*BBCM Indications of priority*: **IN**

5.3.6 **Increased soil carbon sequestration in arable systems and grasslands through changes in crop rotations and grassland management.** Trade-offs with non-$CO_2$ GHG emissions and agricultural productivity (including issues like Biochar).
*Priority: IPWG; Support TP O*
*BBCM Indications of priority*: **BE, ES, RO, EE, NO, SE**

5.3.7 **Agroforestry** for mitigation. Conservation and management of agroforestry resources: models of production, sustainability indicators, and decision support systems based on GIS, remote sensing and ICT. Sustainable management of traditional and new types of agroforestry systems and services.
*Support:StAB*
*BBCM Indications of priority*: **RO, SE**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_ERA-NETs

5.3.2 NEW **ERA-Net on agricultural GHG**: monitoring and mitigation. Technical and economic potential of $CH_4$ and $N_2O$ mitigation, carbon sequestration and reduced emissions from energy use and pre-chain inputs for GHG mitigation in European agricultural systems. Role of climatic variability and agricultural practices for GHG emissions (with ICOS). Reducing uncertainties and improving national agricultural GHG inventories. Assessing new tools for emissions/removals certification, economic and policy measures. Life cycle assessment. (link with Global Research Alliance on Agricultural Greenhouse Gases)
*Priority: IPWG*
*BBCM Indications of priority*: **LU**

### Cat 3. **Need common European effort and developing research**
### ⇨Funding instruments_Infrastructures

5.3.8 **Infrastructures. ICOS.** Consider how to reinforce N cycling studies and impacts on GHG balance in ICOS.

### Cat 2. **Emerging subjects**
### ⇨Scoping instruments (dialog with stakeholders, inputs to Cat 3)

5.2.1 **Socio-economic and technological (?) barriers to GHG mitigation** in European agri-food chains. (2015)
*Support of IPWG*
*BBCM Indications of priority*: **EE, FR, CH, DE, IE, FI, RO, SE, IN, CO**

## Annex 7. List of documents from FACCE-JPI Broad-Based Concluding Meeting

**A.** **Report** of FACCE-JPI Mapping and Foresight **Broad-Based Concluding Meeting,** 24th June 2013 Copenhagen, Denmark.

**B.** **Synthesis of Mapping Meetings 1-5.**

**C.** **Guidelines for the BBCM: Discussion session.**

**D.** **FACCE-JPI Matrix on Implementation; Posters for Broad-Based Concluding Meeting.**

**E.** **Presentations:**

1. Objective of the meeting. *Christine Bunthof (FACCE-CSA WP2)*
2. Toolbox for joint actions for FACCE-JPI. *Nicolas Tinois (FACCE-CSA WP3)*
3. ESFRI Infrastructures in Biological Sciences. *Gabriela Pastori (FACCE-CSA / ESFRI working group BMS)*
4. Key points of MM1, on CT5 Greenhouse Gas Mitigation. *Herman Eijsackers (Wageningen UR, chair MM1)*
5. Key points of MM2, on CT4 Adaptation to Climate Change. *Jean-François Soussana (SAB chair & participant MM2)*
6. Key points of MM3, on CT3 Optimizing trade-offs between food production, biodiversity and ecosystem services. *Lijbert Brussaard (Wageningen UR, participant MM3)*
7. Key points of MM4, on CT1 Sustainable food security under climate change. *José María García Álvarez-Coque (Universidad Politécnica de Valencia)*
8. Key points of MM5, on CT2 Sustainable growth and intensification of agricultural systems. *Hartmut Stalb (BMELV, co-chair MM5)*
9. Implementation, state of the art. *Marina Montedoro (vice chair GB, heading WGIP)*
10. Introduction to the break-out group work. *Núria Duran (FACCE-CSA WP2)*
11. Food for thought: reflection on the mapping and foresight activities. *Peter Keet (former FACCE CSA WP2/ inventor of mapping meeting concept, GPC alternate member)*

**F.** **Toolbox of potential funding instruments** elaborated by FACCE CSA WP3. This document has not been produced for the BBCM, but it has been used as basis of many of the discussions carried out in the meeting.