



FACCEJPI

Thematic Annual Programming Network on Improving Agricultural Soil Quality

Exploratory Workshop Final Report

Tuesday 25th of August 2015
Side Event - Wageningen Soil Conference, Wageningen

Agriculture Food Security and Climate Change

This report was prepared by the FACCE-JPI Secretariat / Dorri te Boekhorst (Wageningen UR), Christine Bunthof (Wageningen UR) and Heather McKhann (INRA).

A. Context

In the Implementation Plan (IP) 2014-2015, FACCE-JPI members have prioritised several joint actions following the development of a Strategic Research Agenda (SRA) in 2012. Both the SRA and IP can be found at: <http://www.faccejpi.com/Strategic-Research-Agenda>. The IP identifies three broad types of joint actions: Aligning (alignment of existing national research programmes in fields where there is already a lot of European research); Investing (financing new research in fields where additional European efforts are warranted), and Exploring (exploring emerging research areas). For each IP action, a specific instrument is suggested. One of the proposed instruments to promote the alignment of national research programmes is the Thematic Annual Programming network (TAP) on improving agricultural soil quality. France leads this action, supported by The Netherlands and Spain.



B. Workshop objectives and desired outcomes

The character of the Workshop was exploratory and informal. It was the first step towards an Annual Programming network and as such the outcomes will be used to identify willingness to participate in a pilot and to see if a common scope could be identified. The objectives of the workshop were to:

- (1) Better define the expected goals and scope of the new TAP instrument (e.g., in terms of implementation modalities; added value of this instrument; possible barriers to implementation);
- (2) Discuss in greater detail its theme and scope (improving agricultural soil quality);
- (3) Agree on next steps in order to effectively launch this new instrument.

C. Report of the Workshop

Introduction

Welcome and Introduction to FACCE-JPI

Huub Löffler – Wageningen UR

Huub opened the Workshop with a welcome and introduction to Wageningen UR and FACCE-JPI, elaborating on the role of JPI's in the European Research Area (ERA). As most of the R&D funding in Europe's Member States is allocated at the national level, alignment of national research policy (and budget) is crucial in creating the ERA. To this end the JPI's were launched and currently there are ten JPI's within which most of the *H2020 Societal Challenges* are covered. JPI's consist of Member States and Associated Countries cooperating together on a voluntary basis in different settings (variable geometry). Joint programming is an iterative process that consists of three steps: from development of a common vision, to formulating a Strategic Research Agenda and finally implementation; which FACCE-JPI established through development of an Implementation Plan with concrete actions and tools. One of the Actions in the IP14-15 is to develop a thematic annual programming network on improving agricultural soil quality. The first step towards such a network was taken by organising this Workshop.

Introduction to the Workshop and its expected outcomes

Maurice Héral (chair) – Agence National de la Recherche (ANR)

The TAP instrument was introduced by Maurice Héral: its aim is to "*coordinate the objectives, methodologies, outputs and outcomes of national research projects (financed by national funding agencies) on one specific research topic {...}*". The international Year of the Soil is the perfect time to launch a TAP on improving agricultural soil quality.

Soil is an important subject that is mentioned in many places in the FACCE SRA, but it plays a pivotal role in Core Theme 2: Environmentally sustainable intensification of agriculture; and Core Theme 5: Mitigation of climate change. The importance of soil is also reflected at the national level priorities of several FACCE-JPI countries, though specific problems, and subsequently research questions, vary from country to country. Soil research is diverse, dispersed and bound strongly to the particular geological and geomorphological surroundings; a strong national and European community is very important, as many issues are strongly localised. Though soil research may be diverse and stretched into many different domains; several overarching -global- concerns that are tied intrinsically to soil research can be identified. These concerns include how to facilitate carbon sequestration, water retention and how soil processes could contribute to climate change mitigation and adaptation. When linking soil sciences and soil research with these societal challenges, it may also warrant a coordinating role for the EU.

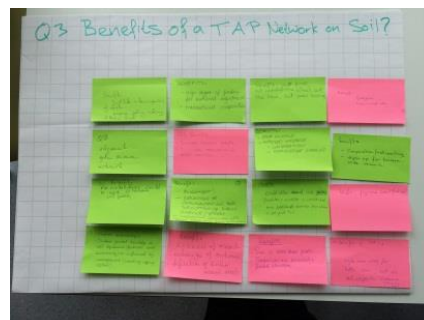
An important step in finding a common scope for a TAP network is identifying a research area that features in most participating countries' national research agendas and programmes. Next, several questions need to be answered on how to put such a network in place, the role of the funding agencies and the character of this network: will it be a network of research projects and/or a network that aims to standardise research protocols, experiments or approaches and shares infrastructures? The first step is to see if an agreement on the general objectives can be reached. Next, find scientific priorities that are suitable for creating a network, followed by deciding on incorporating existing or (only) newly funded projects. Finally, further detailing scientific priorities into a Call text for funding agencies has to be done.

Session 1: Thematic Annual Programming - Instrument

Introduction to the instrument

Heather McKhann – Institute National de Recherche Agronomique (INRA)

This introduction was focused on the TAP instrument and its characteristics. Joint programming is often understood in terms of aligning national research programmes through organising joint calls. However, alignment of research is not (only) about organising joint calls. It is about optimally using existing (national) research funds. This may mean research programmes being jointly defined. The TAP instrument aims to do exactly that: defining (part of) national research programmes together. For FACCE-JPI this will be a new instrument and several questions will arise during the process of organising such a network. The participants were invited to write down their view on three questions (*I: Should the same or different Call text be inserted in the national programmes? II: What are key challenges in soil sciences? III: What are potential benefits of a TAP network?*) on post-its. The results were reviewed in session 3.



Session 2: Thematic Annual Programming - Theme and Scope

Introduction to the Scope 1: Soil Science and Societal Challenges in the FACCE Remit

Rattan Lal – Ohio State University / FACCE Scientific Advisory Board (SAB)

Soil is considered an extremely important topic in science. Its importance is reflected in the many (international) initiatives that relate to soil. Moreover, its importance is stressed in the United Nations' Sustainable Development Goals and in the declaration of 2015 as the "international year of the soils". This declaration aims (among other) to create awareness for the importance of soils in the Societal Challenges, and to leverage political incentive in boosting soil research. An example of the increased attention to, and focus on soils at national level, is the French 4‰ initiative. The initiative aims to improve the organic matter stocks in soil by 4 parts per thousand per year, which is enough to offset all greenhouse gas emissions on the planet. Many aspects that define the basis of (human) life are directly related to and dependant on soils, in terms of food security and nutritional quality (expected decline in micronutrients and proteins as result of climate shocks to the food system); in terms of climate change mitigation and adaptation, but also in terms of land/soil restoration questions and biodiversity in general. Regarding research and research priorities, needs vary across nations and this may imply that, when searching for a common scope, there should be room for specialisation. One of the considerations in organising a TAP network is the effort that has been put into generating a (standardized) soil quality index that interested parties could refer to. However, there are many ways to interpret, measure and qualify soils, depending on the context in which "quality" is defined. It is important to keep in mind that 'soil quality' should not be explained in scientific terms only, but has to be something that users (farmers for example) can relate to and use as well.

Introduction to the Scope 2: Soil and FACCE-JPI from a Dutch perspective

Wim van der Putten – Wageningen UR

Soil science in The Netherlands, as in many other countries, has its roots in the classic division between soil chemistry and soil physics. From these disciplines soil ecology emerged and a centre for soil ecology was founded. In order to bring together these different areas of study and introduce soil ecology, in 2011 the Global Soil Biodiversity Initiative was founded. This initiative consists of scientists worldwide collaborating to advance the "knowledge of soil biodiversity science and ecosystem services for use in policy and management of global terrestrial ecosystems". Soils are extremely important in many different aspects of (human) life, and one of the important considerations in soil research is to incorporate the many

different aspects instead of only working by single discipline. This is especially important when trying to provide scientific input for policy makers dealing with the Societal Challenges. Soil processes are relatively slow and measuring effects of changes in soil take a lot of time. What is needed is long-term research that can integrate optimal (agricultural) production with other ecosystem services. In Europe there are several long-term research sites dedicated to soil research which may prove an excellent starting (or continuation) point for soil sciences under a common European umbrella, such as a TAP network.

Break-out sessions

The break-out sessions were intended to get more focus on the scope of the network. The participants were divided in two groups (mixture of different nationalities, soil scientists and funder representatives). Both groups were asked to focus on the scope and were given five questions (see box 1) to help with this task.

Box 1: Questions for the break-out groups.

*background information: survey results. NB: this is not to repeat results but to get a clearer or more detailed understanding of national priorities.

What are the most pressing research priorities/ gaps in the area of soil research?

What are the FACCE Member States' priorities* in this area?

Given the FACCE remit (intersection of agriculture, food security and climate change); what could be the scope for soil science in relation to agricultural production / food safety / nutrition security?

Can common priorities be distinguished based on the combination of research priorities and national priorities?

Can you prepare an agreed (short) list of topics for a Thematic Annual Programming network?

Group A was asked to look into soil science in relation to agricultural production; food safety and nutrition security. Group B examined soil science in relation to ecosystems; environment and climate change.



Group A report:

The group reached the conclusion that instead of shortlisting main priorities, the most important challenge where FACCE could play an important role in, and where a network for programming soil research would provide much added value, is in **changing the approach to soil research**. Instead of dealing with soil topics only at (sub-)disciplinary level, the challenge is to develop a more holistic approach. This does not only apply to the specific research topic itself, but also in terms of **cooperation, measuring, data collection and storage, indicators and involvement of stakeholders**. A major problem has been the **fragmented approach to soil**. The importance of soil cannot only be viewed from a purely agricultural point of view, but should be interlocked with other ecosystem services as well. Therefore it should be multi-scoped. This also translates into the use of the term 'soil quality'. It was suggested that if the focus remains on soil quality, the scope does too little justice to the complexity and as such is too narrow, while **soil functionality** covers the holistic character much better. In terms of prioritising subjects that may be used for a network, please check Annex I for an overview.



Group B report:

This group reached a similar conclusion as group A. The results (Annex I) show also the need for **sustainable soil management in an integrated approach**. Apart from specific (more disciplinary topics), group B also stresses the need to approach the topic more holistically. They list three main areas to consider: 1) **Link ecosystem services with cultural services** made available by soils; 2) **Biodiversity in relation to soils** and 3) **Food security** (even though this may not be a current priority for Member States). Group B stresses the importance of including urban and peri-urban soils and the relation between soil erosion and water security. A suggestion for a topic that would fit into the FACCE remit and is usually not covered by H2020 programmes could be **the integrated study of soil carbon and soil quality**. In terms of research itself, group B also stresses the importance of **long-term research** as soil characteristics change very slowly. Again, the importance of **involving stakeholders** is highlighted. Soil research should not be about agriculture and forestry only.

Discussion and Wrap-up of Break-out sessions

Maurice Héral

The break-out groups generated much input to come to a focus on scope. Both groups share a similar view on scoping the topic: they both stress the need for an integrated approach to soil science and soil quality. That is where the H2020 programmes stop and that is where FACCE-JPI could create added value. While the scope must be determined by both funders and scientists in agreement with each other, there is a strong need to connect to other initiatives to prevent unnecessary overlap in scope. The 2015 BiodivERsA¹ Call has one of its two themes dedicated to soil management, while the WaterWorks 2015 Call will be a joint call between both Water JPI and FACCE-JPI and will cover aspects relating to soil-water interactions.

From the reports of the break-out groups two major themes were distilled:

- A. **Definitions, indicators, criteria**, meaning of 'good soil quality', characterisation and metrics of soil
- B. **Carbon cycle / organic matter**, including carbon sequestration, improvement, mitigation, increasing soil fertility

Discussion focussed heavily on the preference for a focus on the use of soil functionality instead of soil quality. While functionality does justice to the complexity of soil research, this may still need to be narrowed down to create a fitting scope for a pilot TAP network, as stated before: there are other initiatives covering some aspects already and there is need to integrate the current national priorities in the new FACCE-JPI IP 2016-2017 process. Additional questions were raised on the definition. Several participants urged for a better definition of soil quality (or soil functionality) to create a common, shared understanding of soil quality as this seems to be lacking. Also questions on the need for identifying gaps in existing research were raised. This may be worthwhile but such a mapping is not part of a TAP and there are other existing initiatives working on a research agenda for soil. An important discussion point to get agreement on, is the use of 'soil quality' or 'soil functionality'. The scientific representatives

¹Theme 1: Understanding and managing the biodiversity dynamics of soils and sediments to improve ecosystem functioning and delivery of ecosystem services (<http://www.biodiversa.org/741>).

stressed that the current scientific state-of-art moves away from using 'soil quality' towards 'soil functionality' and urges a new network to do so as well. How to reconcile a rather narrow scope for a pilot while still doing justice to soils' complexity will be a challenge for a TAP network. Another suggestion was to focus the scope on the broader perspective of 'optimal land use' instead of the narrower 'maximisation of production'.

Moving away from the scope to the practical outline of a TAP network, there is a wish among the participating scientists to work together on infrastructures. As there is great need for long-term research (sites and long-term observatories), the question is, if it is possible to build a TAP network around this.

Session 3: Thematic Annual Programming - Implementation of the Instrument

Heather McKhann

This session started with the reminder that this Workshop is the first step in creating a TAP network and that not everything will be clear at the end of this day. Some issues do have to be agreed on before proceeding with the launch of a TAP. To start with, national funders have to be willing to participate in this pilot. In session 1, all participants were asked to write down answers to three questions (see Annex II). These were discussed in this session.

The participants in the Workshop were asked whether they are willing to engage in a pilot with the TAP instrument and there is a clear willingness among the representatives². The present funding representatives acknowledged the added value of aligning soil research (programmes) and are willing to further explore the possibilities for doing so.

Regarding the **preparation of the Programme / Call text**, about 75% of participants prefer a Call text that allows for smart specialisation. Those in favour of one Call text which is the same for each country stress that such an approach will benefit the clarity of a text and will stimulate cooperation more effectively. Those in favour of specialisation mention the national context and national priorities for doing so. **There is a broad consensus that a Programme or Call text should allow for smart specialisation under a common, shared scope.** In practical terms this would mean a Programme or Call text that in each participating Member State has the same general introduction to the scope, followed by a specialised (Call) text that can differ per country. Most funder representatives think adding a common highlight that would allow further specialisation per country in suitable funding programmes can be done. It was suggested to look at the EU programming to define a suitable scope that can act as umbrella and at the same time connect national priorities with the EU's Societal Challenges. Some concern was voiced by the scientific participants with regard to scope and complexity of a Call text: calls still have to be clear for the applicants. Some of the funders argue for a rather narrow scope that allows focus and would enable FACCE to find a niche among other existing cooperation networks or projects.

When asked about **stumbling blocks or key challenges** in creating a TAP network, the most prevailing answer related to creating added value. A TAP network must **add something that cannot be done otherwise, is not done already at national or EU level and that stimulates research in a cost-efficient way.** Other important challenges mentioned are the differences in national time-lines and the need to engage Members States (ownership). On a more general level, challenges will lie in harmonisation of data and methodologies.

For the duration of the network three to five years is suggested. A network such as this needs continuity to have optimal benefits at the national level. In order to function well there is need for some **in-cash funding for networking costs.** Among those able to respond immediately, Germany, Norway and Spain³ may be able to allocate (limited) funds for such activities. The Netherlands and Ireland are unsure, as this also depends on the scope of the topic and future

² From the seven participating funder representatives, two have left at the time of voting. The five present expressed a willingness to participate in a pilot depending on the detailed plan and scope.

³ Spain is based on the survey results.

availability of funds. Switzerland does not have a new call on soil but may be able to align some of the current research within the TAP network and as such allocate funds for networking activities.

There is general agreement on the need for a **network coordinator** or **coordinating committee**. Good coordination will be crucial for success, because the individual research projects need to be added up and used to create added value. The most viable person to do so would be someone from within the scientific community. Another possibility is to create a small commission of funders and scientists that can balance scientific overview with national priorities. How large such a commission should be depends heavily on the number of projects involved in the network. A small network can do with limited national coordination. Germany mentions that they may have some funds for international coordination from their national (BonaRes) programme. This is worthwhile to look into.

Session 4: Conclusions and Practical Next Steps

Maurice Héral

The information collected in this Workshop will be compiled into a report with recommendations to the FACCE-JPI Governing Board. The main conclusions of the Workshop are:

1. There is a global consensus on the instrument and willingness to participate in a pilot;
2. The scope for this network has not been defined, this needs further work;
3. A draft Call/Programme text should be generic for all countries but allow for smart specialisation and connect with the Societal Challenges;
4. There is need for a network coordinator, but in what form depends on the size of the pilot;
5. There may be countries willing and able to finance such a coordinator;
6. There may be countries able and willing to finance networking activities;



There are several remaining questions, of which the **scope of the network** is the most critical. During the last part of the Workshop, the discussion returned to the scope of the network. It was stressed again that using the term 'soil quality' would be inadequate to do justice to the integrated character in which state-of-the-art soil research is done. In order to focus better on the scope of the network, a second workshop is proposed, but other options will be considered as well.

More detail is also needed on the **nature of the network cooperation**. In practical terms the question: "will the network consist of research projects only or also incorporate research facilities and research capacity?" needs to be answered. The possibility of using existing research sites is mentioned specifically as a European niche that FACCE-JPI could use for a TAP network. The Break-out session results also show a need for long-term research cooperation and by using existing infrastructure link both. However, this may limit the ambition of a Thematic Annual Programming network too much and become a mechanism too similar to COST.

There is consensus about integrating ongoing or already finished research and new (upcoming) research. Opening up a network to previous research would allow for generating mass and for

countries entering the network even when they do not foresee a new call related to soil in the near future.

The session ended with a wrap-up of the main conclusions and issues that need to be furthered. A report of the Workshop will be written and distributed among the participants. In order to agree on a scope the topic, another workshop might be necessary. The chair thanked all participants for their valuable contributions.

D. Next steps

One of the most pressing issues that became clear from the Workshop is defining the proper scope for a Thematic Annual Programming network on improving agricultural soil quality that does justice to the holistic and inclusive research needs and still has a well-defined perimeter with respect to other initiatives, such as the BiodivERSA 2015 Call, the WaterWorks2015 Call and the topics proposed in the FACCE-JPI 2016-2017 Implementation Plan. Therefore the FACCE-JPI Scientific Advisory Board will be asked to help define such a perimeter in their next meeting (October 2015). Next, the scope will be discussed with the country representatives who were present at the August Workshop to see if common agreement can be reached. If indeed necessary, another workshop or discussion session can be part of the process. Once the scope has been set, the outline of the TAP will be written down and presented to the FACCE-JPI Governing Board.

D. Annexes

ANNEX I: Results from the Break-out sessions

Break-out session A - Moderator: Rattan Lal | **Reporter:** Roberta Farina

Break-out session B - Moderator: Wim van der Putten | **Reporter:** Rachel Creamer

Scientific and national priorities in soil research	A	B
Relations between soil threats and soil ecosystem services / soil (multi-) functionality	✓	✓
<ul style="list-style-type: none"> • Balance of production with other ecosystem services • Soil and natural capital • Biodiversity 		
Improving knowledge of soil systems /soil biology	✓	✓
<ul style="list-style-type: none"> • Functions of soil • Soils as a resource • Giving value to soil • Soil structure • Microbial communities, enzymatic activities • Metagenomics, metabolomics of soils 		
Devising concepts and strategies for sustainable use of soils	✓	✓
<ul style="list-style-type: none"> • Political decision making / planning • Soil and land management • Economic benefits for farmers • Integrated concept on value of land (including architects/urban planners/economists/...) • Improve farmers perception of soil 		
Sustainable soils	✓	✓
<ul style="list-style-type: none"> • Sustainable use of soil integrated research 		
Methodological improvements	✓	✓
<ul style="list-style-type: none"> • Metrics: how to gather field and landscape metrics • Tools and metrics for measurement of soil quality / characteristics and treshold values • Indicators of soil quality and soil erosion (current metrics bear too heavy on productivity) • Detecting trends 		
Sustainable intensification of agriculture	✓	✓
<ul style="list-style-type: none"> • Yield potential • Soils in urban and peri-urban areas 		
Soil and climate mitigation	✓	✓
<ul style="list-style-type: none"> • Potential for carbon storage in soils • Land-use effects on GHG • Long-term effects of climate change on soil organic carbon stock • Carbon sequestration and nutrient cycling 		
Improving soils / restore soil quality	✓	✓
<ul style="list-style-type: none"> • Increase soil organic matter • Resilience • Soil erosion protection and water cycle • Soil compaction 		
Organic carbon value in the bioeconomy	✓	

Scoping soil science within the FACCE remit	A	B
Benchmark sites across Europe - Agricultural production in relation to other ecosystem services: long-term research funding (Group B: Conflict of land uses)	✓	✓
Reconcile the various aspects of soil and move towards multi-functionality ¹	✓	
Link soil carbon with soil quality		✓
Improving organic farming		✓
Assess mitigation effects of carbon sequestration		✓
Production to be considered in terms of quantity and quality		✓
Agriculture in landscapes		✓
Desertification and restoration		✓
Zero-net land degradation		✓

¹ Note: UK prefers to focus on soils in relation to agriculture.

Common priorities	A	B
Multi-functionality of soil (group B: integrated approach)	√	√
Long-term measurements	√	
Soil carbon enhancement		√
Definition of soil quality and metrics		√
Soil biology		√
Soil degradation and restoration		√

Short list of topics	A	B
Network for long-term experimental (LTE) facilities (group B: long-term experiments)	√	√
Data storage	√	
Organise and use LTE data in the countries to get new information		√
Best practice of measurements	√	
Context dependency – what soils/land-use matter?	√	
What indicators are to be measured?	√	
Develop national programmes from general topics together with funders, soil scientists and other stakeholders		√

ANNEX II: Results from the post-it exercise

Q1: Should all countries use the same or different (headline for) topic?	
10x	Smart specialisation
	<ul style="list-style-type: none"> • Maybe 2-3 subtopics • Countries should lead where they have scientific excellence • No specialisation reduces national success • Funders should embrace TAP proposals more • Same topic but specialisation under this topic • Smart specialisation - common topic • Dependent on climate zones (e.g. soil erosion)
5x	Same topic
	<ul style="list-style-type: none"> • But topic should not be too narrow • Stimulates collaboration • Consistent call • Key challenge to be tackled together • Specialisation when needed
5x	Depending on scope/topic
	<ul style="list-style-type: none"> • Depends on the identified topics / on how the research question is formulated: if it is on soil management for example, specialisation is needed. If the questions regards data or protocols, a single generic - same topic should work fine • Depends on climate zones /soil erosion threats

Q2: What are key challenges for soil sciences (TAP SOIL network)?	
8x	Create added value
	<ul style="list-style-type: none"> • Be careful not to duplicate H2020 programmes • To identify where alignment has a benefit for funders over national funding • To add value and not to be overhead • Stimulate research by 'simple' administrative roles • Light instrument and only if added value is really expected, effective, useful • Value for money • Benefits of the network
4x	Methodology and diversity in data
	<ul style="list-style-type: none"> • Standard methodology • Diversity in data availability • Facilitating inter-comparison of results • Countries' inherent soil variability
3x	(Financing of) coordination
3x	Commitment
	<ul style="list-style-type: none"> • Engage countries • Commitment of funders • Raise enthusiasm among stakeholders to invest in
3x	Timing issues
	<ul style="list-style-type: none"> • Different national systems will require different timescales and approaches • Timeline • Timing
1x	Magnitude of funding
1x	Continuity (long-term programmes)
1x	Scientific understanding of the key issues
7x	Scientific challenges
	<ul style="list-style-type: none"> • Nitrates Directive - water quality protection • Mineral fertilisers • How to regulate animal manure problem • To insert soil organic carbon (SOC) in soil • Soil water conservation • Erosion in orchards • Successful and sustainable land management

Q3: What are benefits of a TAP SOIL network?		
Both Scientific and Policy benefits		
8x	Cooperation & mutual learning	<ul style="list-style-type: none"> • (Transnational) cooperation • Joint forces, peer learning • Synergies • Cross-cutting ideas • Network
5x	Alignment	<ul style="list-style-type: none"> • Alignment (of research) • Common research goals
1x	Could allow shared sites, facilities and models	<i>Would need some additional resource for science, not just T&S</i>
1x	Definition of further research needs	
Scientific benefits		
9x	Improving (European) science	<ul style="list-style-type: none"> • Improved science • Open science • Open up for EU-wide research • Exchange of outcomes • Sum is more than parts • Increase general knowledge on soil dynamics as influenced by management • Going across current frontiers
3x	Improve methodology	<ul style="list-style-type: none"> • Facilitate inter-comparison of results • New methodologies could be used to determine soil quality • Improve methodologies
1x	Individual researchers 'align' their next grant applications	
1x	maybe more money for hidden issues	<i>Such as soil compaction</i>
Policy benefits		
1x	High degree of freedom for national adjustment	
1x	Prepare policy making at the EU level	
1x	Reduction of fragmentation and duplication of public funding /effort	
1x	Facilitate communication across countries	
1x	Funders can use knowledge funded elsewhere	