COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 15.12.2008
SEC(2008)3041

COMMISSION STAFF WORKING DOCUMENT

Accompanying document to the

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Towards a coherent strategy for a European Agricultural Research Agenda

{COM(2008)862 final}

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1. PROCEDURAL AND ORGANISATIONAL ISSUES

1.1. The legal basis for EU action

Regulation (EEC) No. 1728/74 of the Council of 27 June 1974 on the coordination of agricultural research stipulates in Article 11 that *"at regular intervals the Commission shall present to the European Parliament and to the Council a report on the coordination of agricultural research. This report shall contain in particular:*

- *Information on the national organisation of agricultural research;*
- *An overall picture of developments in agricultural research within the Community;*
- *A progress report on the measures adopted under this Regulation;*
- *A forward study of developments which would be desirable in agricultural research in the Member States and in the coordination of that research at Community level, with reference to the aims of the common agricultural policy"*

In article 7, the regulation establishes a Standing Committee on Agricultural Research (SCAR), consisting of representatives of Member States, and presided over by a representative of the Commission, who have a mandate to advise the Commission and the Member States on the coordination of agricultural research in Europe.

The content of this Communication and the accompanying Commission Staff Working Paper is based on the outcome of the various initiatives undertaken by the SCAR Committee over the past four years to identify trends and needs in this sector. It is also based upon the results of a European Commission funded "EU-AGRI-MAPPING" project, which has analysed the status of agricultural and food research in Europe[1].

1.2. The role of a renewed SCAR

1.2.1. Background

Since 1974, the SCAR Committee was under the responsibility of DG Agriculture, which was originally responsible for providing the secretariat support and management of the committee.

With the start of the EU Framework Research Programmes in 1981, DG Agriculture became responsible for managing the agricultural related Framework programmes and utilised SCAR as a 'Programme Committee' for this purpose. In that period, SCAR had a dual function both as a programme committee and also as a committee for exchanging information and for consultation between Member States and the Commission on agricultural research priorities.

In 1998, the management responsibility for agricultural research activities within Framework Programme 5 was transferred from DG Agriculture to DG Research. SCAR then lost its function as a programme committee. However because the responsibility for SCAR remained with DG Agriculture, the Committee was occasionally invited to advise on agricultural research issues.

[1] www.agrifoodresearch.net/library <http://www.agrifoodresearch.net/library>

At the Agricultural Council meeting of 19 July 2004 Commissioner Busquin announced the transfer of SCAR from DG Agriculture to DG Research. He asked the Agricultural Ministers to give their support to SCAR having a major role in the coordination of agricultural research efforts in Europe.

The "new SCAR" was to be as flexible as possible in order to enable cooperation and coordination in view of the European Research area in agricultural research. However, the standard rules of procedure for Committees were to be applied[2].

1.2.2. The context for a "new SCAR"

Over the past three decades, the agenda for agricultural research has changed dramatically. Agricultural practices and production processes must now be set in a much wider context – that of achieving real sustainability in a wide sense and responding directly to the concerns of the consumers of Europe.

Agriculture must cope with new pressures, for example: in relation to environmental demands; changes in rural policy and rural communities; the rise of non-food agricultural production, landscape management, biodiversity and conservation issues; and responses to the demands of reform of the CAP and enlargement. There are also the impacts on European agriculture of obligations as a result of international agreements, such as WTO commitments, the Kyoto protocol and the Convention on Biological Diversity. Such developments make it unlikely that any single European country will have the resources or capacity to adequately address the research necessary to support policy on these and other trans-boundary issues that are emerging.[3]

In the light of these demands and challenges, the new SCAR should work to this wider and up-to-date definition of the term "agricultural research". SCAR should look beyond the narrow aspects of research relating to production and encompass the so called 'fork-to-farm' concept, emphasising research for sustainable agriculture, and including biodiversity, forestry and rural development. Adopting a holistic approach SCAR could address major sectors within a concept of a European "Knowledge Based Bio-Economy" (KBBE) for example[4]; animal health and welfare, consumer and health issues relating to the quality, safety[5] and security of food production and supply; issues of consumer behaviour towards food, nutrition, retailing and markets, as these impact on agro-food research, and issues related to developments in non-traditional and non-food areas of agriculture activity including forestry.

Adopting this broader interpretation of the term "agricultural research" would enable the Committee to take into account all relevant international and European regulations and important trends, and also the major conclusions of the scientific committees of the Commission that impinge on the policy and research agendas that may be relevant to multidisciplinary agricultural research within a concept. Arising from this approach, SCAR could therefore assist the Commission, other institutions and the Member States by providing an assessment of the

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2 Standard rules of procedure adopted by the Commission on 31 January 2001 in accordance with Council Decision 1999/468/EC

3 A more detailed reasoning for a closer cooperation is given in the Discussion Document "A European Research Area for Food, Agriculture, Nature and Rural Development and Environment" from 10.05.2004 (Annex 3)

4 Fishery research is not included here because this sector has its own established coordination mechanisms at European and international scale

5 Taking fully into account the mandate of other bodies such as the European Food Standards Agency and its own committees

relevance of these topics including socio-economic impact, advise on research priority setting at the European level and on related actions that would provide better coordination of support for evidence based policy making in the future.

1.2.3. Design principles for a new conception of SCAR

Tasks

The main role for SCAR is to support the Commission and member states in their desire for better coordination of agricultural research across the European Research Area. This will involve a number of tasks of strategic importance that can be grouped under three broad and flexible headings:

Analytical functions include:

- Monitoring of important European and international trends in the agro-food sector and assessment of the research implications;
- Monitoring the status of coordination of agricultural research, including the development of relevant ERA-Nets and related instruments and policies;
- Assessment of research gaps and the implications of these for agriculture when viewed across the spectrum of European policies and action plans;
- Providing an overview of national research activity in the Agro-food sector, in relation to European policy targets and developments.

Knowledge utilisation might include:

- To promote and monitor developments in multilateral cooperation in agriculture research;
- To provide a forum for consideration of emerging issues and potential research topics, including ad hoc studies and foresight and horizon scanning activities; and
- To facilitate the better exchange and subsequent use of knowledge, through better coordination of, and availability of research knowledge and evidence

Advice includes:

- Advising all the relevant DGs of the Commission, other institutions of the EU and Member States on priorities and measures in the area of agricultural research (as defined above);
- Advising on possible research questions for scientific support to Community agricultural policy within the EU-Framework Programmes and other Community action plans; however, the renewed SCAR will be complementary to existing mechanisms under the EU Framework Programmes.
- Advising on where alternative approaches to coordination of research programmes might be more appropriate.

SCAR organisation and operation

SCAR meeting

a) Tasks:

- To provide a high-level forum for advising and agreeing upon activities under the new mandate;
- To set up and monitor the operation of specific ad hoc working groups of variable membership, where this is necessary to achieve an agreed action; and,
- To consider proposals for action that might come from Member States, and from non-research advisory committees of the institutions of the Union and from other stakeholders considered to be directly relevant.

b) Representation:

- High-level representatives from all Member States'[6] administrations that have substantive responsibility for agricultural research planning or funding; and,
- Depending on the topic to be discussed Commission DG staff responsible for this specific area will participate.

c) Meetings: the Commission will organise a SCAR plenary meeting twice a year.

Working Groups

a) Tasks:

- Preparation of discussion papers on specific topics for a wider debate in the SCAR meetings.
- A standing "oversight working group" (SCAR-Working Group), should operate as a think-tank and an extended secretariat between regular SCAR meetings to prepare initiatives and documents. It should be based on participation of the EU presidency specially supported by the incoming and outgoing presidency and interested Member States.
- Undertaking of specific activities and tasks between interested Member States (variable geometry). Flexibility and 'à la carte' nature of participation in any working groups are essential for success. There is also a need to consider the use of "own resources" where this would help to facilitate action.

b) Representation:

- Staff nominated by the most appropriate national organisations and at the appropriate level to achieve action. If need arises external experts can be invited.

c) Meetings: according to need.

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[6] The representatives of the third country or organisation are invited to attend the meetings of the committee, in accordance with the Council act, the agreement made by the Community, the Association Council decision or other basic instrument that provides for the presence of these observers.

Secretariat

a) Tasks:

- preparation of and follow-up from plenary meetings (e.g. coordination of the agenda, invitation, documents for the meeting, minutes); and,

- Secretariat functions for the other working groups.

b) Representation:

- DG Research staff will have the responsibility in close contact with the presidency of the EU and supported by voluntary time of Member State staff made available to SCAR ("virtual secretariat"). In addition specific tasks (for example mapping of the European research capacity) could be out sourced to specific support actions of the EU Framework Programmes or funded by Member States.

1.2.4. Relationship with other committees active in research coordination

The renewed SCAR will be a flexible structure, complementary to existing mechanisms under the EU Framework Programmes (e.g. KBBE-Net[7], FP7 Theme 2 FAFB Programme Committee).

[7] KBBE-Net was established in 2006 by the Commission following the implementation of its third Progress Report on the Action Plan of the European Life Sciences and Biotechnology Strategy (LSB) - COM (2005) 286, 29 June 2005. This network of Member States fulfils its mandate in co-ordination with SCAR and focuses on research solutions based on renewable biological resources from plants, animals, microbes, including bio-waste, thus contributing to the review and implementation of the LSB Strategy.

2. THE NEW CONTEXT FOR AGRICULTURAL RESEARCH IN EUROPE

2.1. Key figures from the "EU-AGRI-MAPPING" project (FP6-SSP4)[8]

In its final report in January 2008, the "EU-AGRI-MAPPING" project (FP6-SSP4) provides an overview of the agricultural research landscape from the perspective of organisation and activities. The objective was to provide the Commission with a synthesis of the research systems and the trends in research activities.

The study covers all areas related to agricultural and food research including research dedicated to emerging challenges of the European agricultural and food sector. It maps a wide range of scientific disciplines and research issues going further than those directly related to food production. It includes for example non-food products, nutrition and health, forestry, natural resources management, landscape management, rural development, agricultural economics etc. The geographical coverage is the EU-27 plus Croatia, Iceland, Israel, Norway, Switzerland and Turkey (countries associated to the Framework Programme, FP).

The study highlighted that the overall European capacity and financial support is decreasing while agri-food research systems need to cope with new challenges such as energy and climate change. This may be a concern for the future. A closer look at the agri-food education system could help to determine if this trend could represent a threat for the future.

There is a wide disparity in the research systems and the European agri-food research landscape is composed of several different layers. A common trend in some countries is reforming the research systems by merging institutions, better coordination of research efforts through the establishment of research councils, and the allocation of research grants through competitive bids.

The study reveals that research-intensive countries (most of them located in the north of Europe) have already undertaken restructuring of their research systems.According to performance indicators such as the number of citations, these countries are in the lead leading. Research trends also indicate that these countries have integrated earlier than others the new policy (energy, climate change, biodiversity) and technological (consumer research, genomics, nanotechnology) challenges. Exchange of practices and sharing of experience with these leading countries could be very beneficial to those that are currently implementing changes in their research systems.

The study also shows that European agri-food research performances are handicapped by obsolete infrastructures in many of the New Member States. This, combined with the scattering of the research capacity and the difficulties to implement efficient research management, constitutes a serious threat for European research as it leads to inefficient utilisation of the research potential.

Finally, the study confirmed the need for a stronger coordination of research planning and funding at European level. This need is reinforced by the important place occupied by the Common Agricultural Policy in European policies.

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[8] http://www.agrifoodresearch.net/library

2.2. New challenges for European agriculture

Fundamental changes in the agricultural sector which are in many cases tied to emerging global challenges have required that research in this field be strengthened and re-orientated.

Productivity gains, largely supported by technological progress and overall economic pressures have led to a considerable structural adjustment in European agriculture. In general this trend varies across Member States owing to national and regional specificities with regard to climatic and natural conditions and the inherent institutional framework, notably for land, labour and capital markets.

While the number of farmers is declining in EU-27 as a whole, these structural changes are particularly visible between the newer EU12 and older EU15 Member States. By contrast, the total agricultural area has declined only slightly and although average farm size has increased there is a huge range of different farming systems in operation. In labour terms, the most striking and challenging feature is the ageing of the agricultural labour force and the continued high proportion of holdings with no other gainful activity than agriculture.

In overall terms, the socio-economic and environmental impact of agriculture in the EU is still very significant. While Europe's primary agricultural sector has exhibited the same pattern of long-term decline in its share in the economy common to all developed countries, the combined agri-food sector is still a key employer and generator of wealth (900 Billion € turnover, 20 million employees). In a territorial context, agriculture and forestry continues to be the chief land use mechanism in the EU while agriculture has retained its central role in the social fabric of rural areas and their future development.

The implications of modern farming practices, particularly in EU 12 countries, could result in increased unemployment as farms go from small to large scale, and research should not ignore the resulting socio-economic challenges.

In Europe, the reform process of the Common Agricultural Policy (CAP) continues to drive change in farming. Since the first major reform in 1992, EU agriculture has been forced to meet the challenge of increasing competitiveness within the context of the potential negative environmental impacts of modern production methods. Agriculture has also had to respond to the increase in consumer concerns and awareness of food safety, quality and affordability and more recently on the demand for a healthier diet.

While the availability of food supply at reasonable prices to the consumer remain an underlying objective of the CAP, since the Agenda 2000 reforms, which prepared the ground for the major enlargement to EU-25, these concerns have to be seen within a sustainable development context. The breaking of the link between support and production and the introduction of cross-compliance requirements with EU legislation regarding farm production methods, which form the main elements of the 2003 reform, have brought market orientation and the meeting of environmental and other production standards as the key determinants for the sustainable future of the EU farm sector.

As a consequence of the orientation of the reformed CAP towards sustainability, the so-called Second Pillar of the CAP has shifted the EU policy framework towards rural development. This has enabled the policy framework to provide more opportunities to target support to specific priorities of societal importance, such as the protection of the environment and the enhancement

of quality of life in rural areas as well as a range of non-commodity outputs produced by agriculture such as access, recreation, conservation, amenity, heritage and tourism

Throughout this reform process, global drivers have changed the international context for EU food and farming with the demand for food increasing due to a rising world population, efforts to reduce malnutrition, the increasing consumption of livestock products linked to growing wealth and greater international trade. The EU is by now the largest agricultural exporter, of mainly high value products, as well as the biggest agricultural importer in the world, remaining by far the largest market for developing countries.

In addition a wide range of new challenges face EU agriculture. Further globalisation, tightening energy supplies, climate change, unsustainable consumption of natural resources and the recent rise of food prices will all require a profound understanding of the triggers of future changes, their inter-relationship and their potential impact on European agriculture and the rural space as a whole.

2.3. Need for a renewed Agricultural Research Agenda

To cope with these challenges, it is widely recognised[9] that there is a need for a renewed and strengthened agricultural research area. Agricultural research should provide the necessary knowledge for a thorough understanding of rural development, of the drivers and impediments for sustainability, and the required science, new technologies and innovation needed for the development of the agricultural sector.

Furthermore the complexity of rural development must allow for the inclusion of research as a crucial tool to help broaden and enhance its impact.

Until recently quantitative analysis of the CAP mainly focused on the First Pillar and economic models have been developed to this end. The situation has changed with the complexity of the Second Pillar, driven by characteristics such as the principle of subsidiarity or the diversity and multiplicity of rural development measures. Here development and application of appropriate quantitative and qualitative research methods will be of crucial importance to improve the analytical capacity with respect to growing importance of the Second Pillar.

2.4. Need for action at EU level in the field of research

Solutions to these projected developments will be needed in order to provide a sustainable future for the European agricultural sector and allow it to remain competitive worldwide. By the nature of these complex, inter-linked challenges it is unlikely that any one Member State will have the resources or capacity to carry out the research needed to support the development and implementation of policy relating to these and other trans-boundary issues.

In line with the Commission's commitment to delivering "Better Regulation" and, in particular, providing high quality impact assessments, scientific support to policy using results and expertise originating from the research community have an increasing role in the identification of those challenges and the economic, environmental and social consequences of any possible policy intervention.

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[9] Ref. SCAR Foresight, World Development Report 2008; IPCC reports; Millennium Ecosystem System Assessment.

In response to these societal demands, and although European agricultural research involves a broad spectrum of disciplines and stakeholders, research efforts often remain fragmented, poorly coordinated, underinvested, and lack critical mass.

In Europe several mechanisms are in place, and especially under the EU's Framework Programme, which help to foster collaboration between research providers. Accordingly increasing coordination and cooperation between national research programmes, especially at the level of national funding, is an intrinsic priority in the creation of the European Research Area.

One of the primary coordination mechanisms introduced by the 6th EU Framework Programme is the ERA-NET scheme[10], providing funding for the networking of programme makers and managers (those working in Ministries or in national funding agencies) and covers coordinated actions in any field of science and technology.

Although several ERA-NETs of relevance to the area of agricultural research were launched the Agriculture Council agreed (November 2004) that collaboration in this area would benefit from a more structured approach. This conclusion has been taken forward by the Standing Committee on Agricultural Research (SCAR).

The concept of Joint Programming[11] goes a step further than the ERA-NET scheme and elicits the direct cooperation of Member State public programmes in defining common visions, strategic research agendas, and the pooling of resources to tackle specific areas together. Some major societal problems in Europe that are linked, for example, to climate change, the energy crisis or food supplies would benefit in particular from a critical mass of public research efforts, as identified in the conclusions of the informal Competiveness Council meeting on 17-18 July 2008 in Versailles.

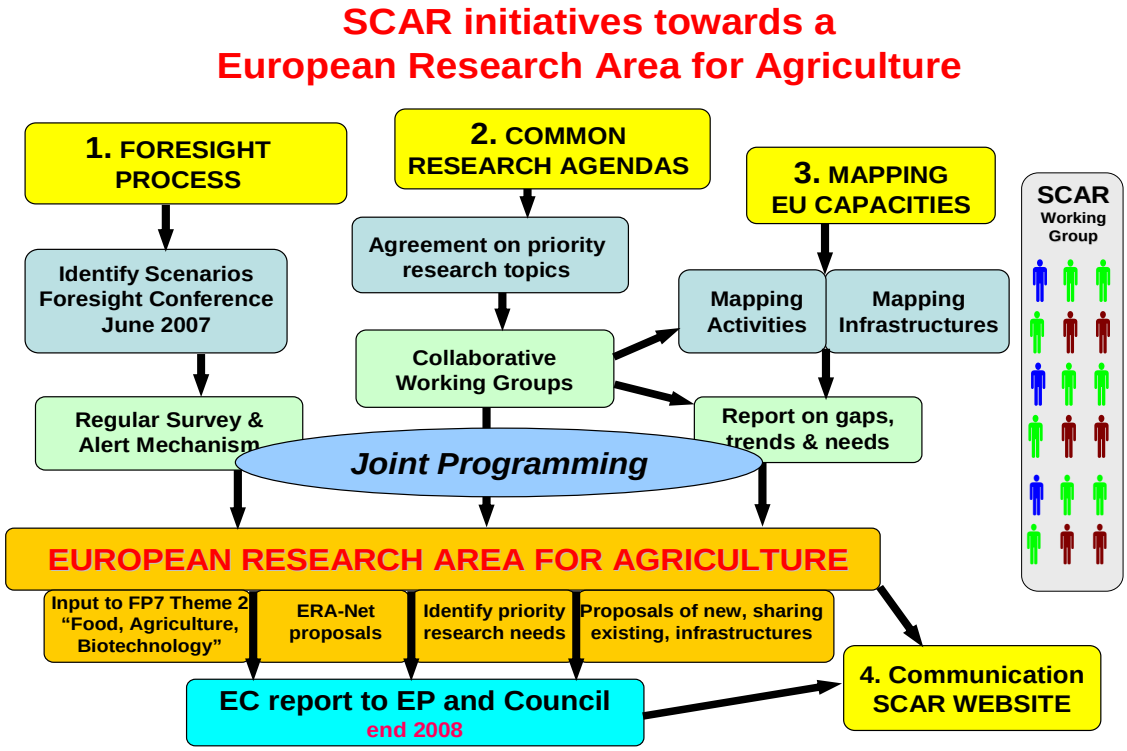
The SCAR Committee was mentioned as a good example of a possible network structure in any new Joint Programming process.

[10] Article 169 of the EC Treaty also enables the Community to participate in research programmes undertaken jointly by several Member States and is intended for topics of high political visibility and relevance.

[11] "Towards Joint Programming in Research" COM(2008) 468 final, 15.07.2008

3. INITIATIVES UNDERTAKEN BY SCAR

The SCAR Committee is taking forward coordination action on a number of fronts. It has taken a strategic view of on-going collaboration between funding bodies in Europe, identified priority areas for further collaboration and established a number of member state Collaborative Working Groups (CWGs). It has initiated a foresight exercise to formulate possible scenarios for European agriculture over the next 20 years on which to base the prioritisation of agriculture-related research in Europe in the medium to long term. The Committee is also involved in the mapping of EU agricultural research capacity through the monitoring of specific European Commission funded projects and studies, which aim to analyse the status of agricultural and food research in Europe and identify the corresponding trends and needs.



3.1. Towards common research agendas

3.1.1. Prioritisation exercise

At the 2599th session of the Agriculture Council of 19 July 2004, the Dutch Presidency articulated the possible merits of enhanced cooperation between research funders and programme managers in the domain of Agriculture, Food, Rural Development and Fisheries. The delegations of the 25 EU Member States received a questionnaire aimed at producing an overview of the research funding structures, as well as the current and future policy and research priorities of each EU Member State in this field.

The meeting was attended by Commissioners Busquin and Fischler, who suggested considering the SCAR Committee as the operational instrument for the implementation of possible common research agendas/activities to be set up at European level.

On the basis of Member States' responses to the questionnaire, the Dutch Presidency drew up a report[12] which was submitted to the 2619th session of the Agriculture Council of 22 November 2004 and the principal conclusions on the actions to be undertaken were unanimously adopted.

Building on the Dutch Presidency report, SCAR adopted a structured approach for prioritisation of research topics. A comprehensive table of co-operation and coordination activities, both research provider and research funder (ANNEX 1) was used alongside a list of agreed member state priorities for collaboration to identify key areas for targeted action through CWGs. The table is regularly updated.

3.1.2. The establishment of Collaborative Working Groups (CWGs)

In June 2005 SCAR identified 52 themes for potential collaboration of research funders and programme managers with 26 countries offering to participate in at least one of these. Country coordinators were identified for 10 of the themes and CWGs established and the first of these met in September 2005. In the following years, 4 additional CWG were established. Further information on the CWGs can be found (ANNEX 2).

CWG Title	Coordinator	SCAR countries
ICT and Robotics in Agro-Food Industries => ERA-NET PROPOSAL "ICT-AGRI"	Denmark	11
Renewable Raw Materials and their Applications in Non-Food Industry	Germany	18
Sustainable Livestock Production from Grasslands	Ireland	21
Relevant Issues for Mediterranean Agriculture => BECAME AN ERA-NET "ARIMNet"	Italy/France	13
Agriculture and Sustainable Development => ERA-NET PROPOSAL "RURAGRI"	France	11
Animal Health => BECAME AN ERA-NET "EMIDA" Animal Welfare started as a CWG	UK	21
Advanced Technologies for Climatic Control of Greenhouses and Livestock Housing	Israel	14
Adaptation of Human Nutrition to Environment Evolution	France	10
Ecology for Ecosystems & Natural Resources Sustainable Management	France	8
Development of Sustainable Agriculture in the Baltic Sea Region	Poland	8
Common research agenda for EU rural policy => ERA-NET PROPOSAL "RURAGRI"	Sweden/Netherlands	7
Climate Change and Agriculture	Spain	22
Agriculture and Energy	Germany	21
Shared Infrastructures in the field of Agricultural Research	France	15

[12] "Towards cooperation between research funders and programme managers in the domain of Agriculture, Food, Rural Development and Fisheries in the European Union" - Report written for The Netherlands Ministry of Agriculture, Nature and Food Quality

CWGs are working in a similar way to ERA-Nets, following the same step-by-step approach - focussing on information exchange during the early stages, the identification of gaps in research and priority areas for collaboration but, ultimately, they should be aiming for common research calls. However, they are different in that do not have the financial support from the Commission enjoyed by the ERA-Nets, so need a strong commitment from participating countries in order to succeed. The role of SCAR in ensuring an adequate level of commitment needs to be considered.

Although they were intended to provide an alternative, more flexible, mechanism to the ERA-Net scheme, the majority of CWGs have already indicated their intention to apply for ERA-NET status in FP7. Given that funding for this is limited and not all CWGs have the opportunity to become ERA-Nets, consideration is needed about how progress can be made in the absence of external financial support. This issue also needs to be addressed for ERA-Nets when their financial support comes to an end.

However, the dynamism of several CWGs in terms of commitment and participation paved the way for opening ERA-Nets opportunities in FP7 so that five CWGs declared their intention to submit ERA-Net proposals in the first relevant calls for proposals. Two of them (Animal health, Relevant Issues for Mediterranean Agriculture) submitted successful proposals in call FP7-ERANET-2007 and became *de facto* ERA-Net projects. Three of them (ICT and Robotics in Agro-Food Industries, Agriculture and Sustainable Development, Common research agenda for EU rural policy) submitted successful proposals in call FP7-ERANET-2008 and are currently being negotiated.

3.1.3. Strategic oversight in the area of agricultural research

The SCAR is currently addressing the question on how best to support the CWGs in their effort to become self-sustaining and in terms of their interaction with other research coordination bodies such as ERA-Nets and European Technology Platforms.

This question is addressed in the wider role of SCAR in providing strategic oversight in the area of agricultural research collaboration which foresees:

- Monitoring the status of coordination of agricultural research, including the development of CWGs, relevant ERA-Nets and related instruments and policies
- Assessment of research gaps and the implications of these for agriculture when viewed across the spectrum of European policies and action plans
- Advising on where alternative approaches to coordination of research programmes might be more appropriate

To do this effectively the Committee will need to take into consideration many factors like developments in specific research programme collaborations that occur bilaterally and multilaterally between member state funding organisations that fall outside of FP modalities and instruments; updates on Commission initiatives in research cooperation with third countries and international organisations and actions under the Joint Research Centre (JRC); updates on collaborative projects (Integrated Projects, Networks of Excellence, etc) that are directly relevant to agro-research and policy interests; intelligence from DG AGRI that relates to research needs for policy support and also from other DGs where directly relevant.

In that context, the SCAR Secretariat has carried out an analysis of current activities in selected ERA-Nets with a potential thematic relation to FP7, Specific Programme Cooperation, Theme 2 Food, Agriculture and Fisheries and Biotechnology. The aim of the analysis is to ensure a coherent approach in the identification of research topics within ERA-Net joint calls on one side and FP7-KBBE work-programmes on the other, thus identifying gaps, avoid duplications and promoting synergies.

Such an exercise has also the scope to bring together the KBBE ERA-Net community to share views on mutual achievements and expectations, and to promote mutual learning and fully benefit from the experience gained. The ERA-Net Learning Platform and NETWATCH central information tool launched by the European Commission may be useful in that respect.

3.2. Foresight process

3.2.1. The launch of the process

In recent decades human impacts on the environment have emerged as a serious concern. Though climate change is receiving the most public attention, there are many other factors that threaten ecosystems (including agriculture itself) and that have an adverse effect on agriculture, forests and fisheries.

To enable agriculture to cope with a range of complex and interlinked challenges, such as rapidly increasing globalisation, climate change and unsustainable consumption of natural resources, the development of clear futures scenarios are important in ensuring that the right questions are asked.

This was the major conclusion of an informal meeting of EU agriculture ministers in Krems on 28-30 May 2006[13]. Ministers felt that better coordination of research was essential to enable Europe to successfully face the profound changes that lie ahead for the agricultural sector, and that a wide foresight process to be initiated by SCAR would allow an assessment of trends and their implications in considering the prospects for agriculture in a 20-year perspective and to enable the necessary political answers to be found.

The 4th SCAR-Plenary in June 2006 endorsed the overall objective of analysing possible scenarios for European agriculture in a 20-year perspective through an exercise based on a review of existing foresight studies. These scenarios were then to be used in the identification of priority research needs for the medium and long term.

3.2.2. A Foresight Expert Group

The ambition of this initiative required expert support so a team of 10 independent experts with relevant knowledge and experience was contracted by the European Commission.

The major task of this expert group was to review and synthesise existing analytical and foresight material in relation to the available foresight studies relating to the eight "major driving forces" for agriculture in Europe that had been identified by the SCAR Working Group[14]:

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13 Presidency Conclusions, 16 June 2006

14 The list was based on one drawn up during the EURAGRI members meeting in York (2005).

climate change	health
environment	societal changes
economy and trade	rural economy
energy	science and technology

In a first step, the expert group produced a foresight paper on each of these driving forces for agriculture in Europe, including an initial consideration of the perspectives and gaps for future agricultural research.

In a second step, the analysis of these major driving forces and their possible interactions led to the identification of four futures scenarios (Climate Shock, Energy Crisis, Food Crisis, and Cooperation with Nature) to be used, both at the European and national level, in the definition of better policies and in the development of a medium to long-term research agenda for European agriculture which is sufficiently robust and evidence-based. The analysis is illustrated in a synthesis paper.

3.2.3. The involvement of the stakeholders

The reports from the Expert Group were disseminated among relevant stakeholders and discussed, together with other foresight exercises, in a Workshop on *"Foresight to Set Long-Term European Agricultural Research Priorities"*, which was held in Stockholm on 29-30 March 2007. The event was jointly organised by the Swedish Ministry of Agriculture, the Swedish Research Council (FORMAS), the SCAR and the Commission, and gathered around 60 high-level experts and stakeholders.

The views expressed and conclusions drawn during the workshop were used, along with other stakeholder consultation, in preparing input for the Conference on *"Towards Future Challenges of Agricultural Research in Europe"* held in Brussels on 26-27 June 2007[15]. The event brought together around 400 stakeholders from diverse background (e.g. the agriculture, food, forestry, aquaculture, rural development, and consumer science/behaviour, and economics areas) from across the EU and was a major forum for discussion of foresight in relation to the European long term agriculture-related research agenda in a global context.

The first results of this exercise led to the decision to launch new joint programming initiatives in areas which represent major societal challenges. Among them: the setting up of two new CWGs on "climate change and agriculture" and "agriculture and energy".

Furthermore, a foresight monitoring and signalling mechanism aimed at providing better insight into existing and new trends is also being established on a regular basis in order to enable a better and earlier identification of emerging issues and risks to prepare for forth-coming uncertainties *(see 4.4)*.

[15] http://ec.europa.eu/research/conferences/2007/scar/report_en.htm

3.3. Mapping EU capacities

3.3.1. The "EU-AGRI-MAPPING" project (see 2.1)

The SCAR Committee is involved in the mapping of EU agricultural research capacity through the European Commission funded "EU-AGRI-MAPPING" project, which analysed the status of agricultural and food research in Europe and identify trends and needs in this field. In providing key figures on the national organisation of agricultural research and an overall picture of developments in agricultural research within the EU, the project contributed to the assessment of desirable developments in agricultural research in the Member/Associated States and in the coordination of that research at EU level.

3.3.2. Initiatives on agricultural research infrastructures

As part of SCAR's strategic discussions on agricultural research in Europe, the issue of research infrastructures was considered to be a priority. In September 2005 the Committee addressed a note to ESFRI (European Strategy Forum for Research Infrastructures) on the issue of very large infrastructures of relevance to agriculture[16]. This was an attempt to raise the profile of agriculture research infrastructures in the ESFRI discussions and to provide examples of the large research facilities that might be needed in this area.

In addition to the more familiar and general large-scale infrastructures for research, SCAR has highlighted the high demand for networking of distributed facilities and clusters of expertise, and therefore for management. These so called "virtual" centres of infrastructures carry an additional resource cost in, for example, providing interoperability. Infrastructures also provide a range of unique support services (for research) that are critical to delivery. For example: unique data management, interpretation and handling capacities; 'knowledge management infrastructures' (such as statistics, design technologies, epidemiology, risk assessment expertise, data archives, and 'social science' infrastructures) and also unique support facilities (such as high-level containment and experimental/housing facilities and expert trained support personnel). Comparability of operations and management across networked facilities also needs to be supported.

The Committee also highlighted the need for infrastructures programmes to support training, including the training of support personnel and technical expertise, as research success is dependant upon technical development.

At its meeting on June 2006 SCAR agreed that the identification and subsequent delivery of specific infrastructures, of specialist capacities and of services for research, should be for national, European and international funders to determine, acting in a systematic, coordinated and anticipatory way. Decisions should be informed by the research providers and should be based upon clear evidence of need and of potential long-term value. With this in mind, SCAR has contacted its Collaborative Working Groups and relevant ERA-NETs, inviting them to consider the research infrastructures issue in the context of their developing plans for future research coordination, and to provide in particular:

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[16] SCAR note to ESFRI, "Research infrastructures required in the field of agricultural research", 31 August 2005.

- An overview of the main activities of the ERA-NET/CWG in the field of research infrastructures

- A mapping of the main existing facilities detailing the priorities to improve European capacity in the particular domain

- Information on the main obstacles to the sharing of infrastructures at the European level

- Suggestions for a better common use of these infrastructures

Building on this survey, SCAR decided at its meeting on June 2008 that a new CWG in the area of "shared infrastructures for European agro-food research" would be set up with the aim to identify the future needs of agricultural research and design new models of governance in order to share infrastructures efficiently at a European scale.

The expected deliverables from the CWG are the following:

- A report on current initiatives on agricultural research infrastructures at national and European level: list, analysis, applications

- Results of the CWG survey

- A report on research themes having priorities in the future and their need in infrastructures, giving an analysis of the gaps and advice for a co-operative agenda on EU level

- A report giving advice for an efficient sharing of research infrastructures at a European scale

3.3.3. A dedicated website

A dedicated website provides a complete and updated picture of the national agricultural research systems in all SCAR countries[17].

[17] http://ec.europa.eu/research/agriculture/scar/index_en.cfm

4. KEY ACTIONS FOR A COHERENT EUROPEAN AGRICULTURAL RESEARCH AGENDA

4.1. Towards a more sustainable agriculture in the face of global competition

It is widely recognised that the worldwide resource base (biodiversity, soil, water) is struggling to cope with the interlinked effects of energy shortages, climate change and unsustainable consumption of natural resources, with an increasing risk of crossing critical thresholds which may trigger abrupt system changes.

The maintenance of a viable resource base is a pre-condition for all ecosystem functions and for the achievement of a sustainable European agriculture. Sustainability, which covers economic, social and environmental aspects, as well as the public good aspects of agriculture, is of outmost importance.

In parallel, globalisation makes the need for an internationally competitive European agricultural sector an increasingly important issue. The major research challenge is how to reconcile these two goals of a sustainable production system while remaining competitive in world markets.

Alongside ensuring sustainability and competiveness, agricultural research needs to provide evidence to support appropriate policy development and implementation.

To achieve this goal, the EU needs sufficient research capacity to analyse problems from different disciplinary perspectives, synthesise these findings in a holistic way (economic, ecological and social) and provide the necessary mechanisms to ensure the right research is carried out.

4.2. New priority areas for the future Agricultural Research Agenda

New emerging challenges require targeted responses from appropriate priority research areas for the future Agricultural Research Agenda.

The foresight process initiated by SCAR and the conclusions from the June 2007 Conference highlighted the importance of a number of topics such as biodiversity, organic farming, food safety, integration of environmental technologies within agriculture, biotechnology, emerging animal diseases, as well as emerging plant pests and diseases. In addition it was remarked that the interface between agriculture, climate change, and energy were major societal challenges deserving a more prominent place on any future research agenda.

This trend was also confirmed by the European Council of 20 June 2008[18] stating that "*there is a need to pursue innovation, research and development of agricultural production, notably to enhance its energy efficiency, productivity growth and ability to adapt to climate change*."

Climate change

Climate change is one of the main hazards to sustainable development, and represents one of the greatest environmental challenges, adversely affecting global economy, health and social welfare. Climate change can affect crop yields, livestock management and the location of

[18] Presidency Conclusion n° 28 of the European Council, 20 June 2008

production and can also have important consequences for farm income, land use and rural economies in certain parts of Europe.

The "Health Check" of the CAP is addressing the risks of climate change as one of the new challenges and the area has become an issue for European national research programmes, which need to address the risks to agriculture and search for improved agricultural practices that will help the agricultural sector to adapt and mitigate the impacts of farming on climate.

In this context, it is underlined the importance of continued research on the contribution that soil management practices can have in maintaining or increasing soil organic matter levels across the EU. Soil organic matter plays a crucial role not only in the carbon cycle, but also for supporting soil fertility, improving soil structure, and increasing water retention, thus resilience of soils to climatic stresses.

The Commission's Green Paper *"Adapting to climate change in Europe – options for EU action"* indicated that adaptation policies are emerging in nearly all Member States, and that it is essential to share experiences from early adaptation action and results from research. Adaptation to climate change is likely to benefit from experience gained in reaction to extreme climate events and from implementation of specific and proactive climate change risk management.

Agriculture and climate change was identified as a priority area by SCAR foresight activity carried out during 2006/07[19] and as a significant gap in the coordination of research at the European level. At its meeting in December 2007 SCAR, therefore, agreed that a new CWG on "*Climate change and agriculture"* should be formed to consider how climate change affects agriculture, and how agriculture could be adapted to climate change (including mitigation of agricultural impacts on climate change). A strategy based on a variable geometry model might be an appropriate approach.

Energy

As regards the energy issue, growing demands for food, bio-energy and biomass for non-food applications take place in a world with shrinking water and land resources, increasing soil degradation and rising temperatures all impairing on land productivity.

This scenario gives a strong reminder to governments to develop agricultural technologies and to adjust energy and agriculture policies (e.g. EU energy policy and targets), underpinned by appropriate research support measures at the agriculture-energy-interface.

Currently, high expectations for bioenergy (independency of fossil resources, climate change mitigation, and job creation in the rural areas) stand vis-à-vis the increasing public concerns (competition with food production, ecological side-effects, profitability, negative effects in developing countries); which makes the agriculture-energy-interface a very sensitive political issue for the future.

Several on-going activities in FP 6 and 7 Themes (in particular, IPs and NoEs), ERA-NETs, SCAR-CWGs, ETPs, etc. are - fully or partly - dealing with the agriculture-energy-interface; however, there are no overarching mechanisms and structures to analyze the links between them and to give strategic advice to the research funders in the area for a closer co-operation and co-ordination.

[19] http://ec.europa.eu/research/conferences/2007/scar/report_en.htm

A new CWG *"Agriculture-Energy-Interface"* might help elaborating the co-ordination needs for research funding at the interface between agriculture and energy in the broadest sense ("holistic approach") covering not only the scientific-technological challenges for biomass and bioenergy production, but also the industrial, ecological, socio-economic and rural dimension of the subject. Particular attention will be paid to the effects of biofuel and biomass production on water quality, soil organic matter and biodiversity.

4.3. Strengthening the agricultural knowledge production and sharing in Europe

The mounting challenges facing agro-food and rural sectors in Europe call for revising the links between knowledge production and its use to foster innovation, as clearly indicated by the key messages from the foresight process and the Brussels international Conference.

Research could play a stronger role, if different actors (farmers, researchers, advisory services, consumers, private sector, civil society, policy makers) are better integrated in actual agenda setting and become an integral part of the research process in the form of an innovation network. At the same time agricultural research needs to become more innovative, and it needs to find ways to attract top scientists and technologists into the sector.

The reward system for academic university research is oriented towards publications in peer reviewed journals, while an efficient innovation network would provide tailor made research solutions responding directly to practical problems which take full account of farmers and other stakeholders' knowledge. Integrated research and advisory systems could provide a solution, but in many European regions public advisory systems no longer exist or have been privatised. A new approach to advisory systems in the frame of the CAP could be a new starting point if they were linked to knowledge networks. Both vocational and higher education must be strengthened, so that farmers would benefit from life long learning and university research would benefit from the inclusion of practical aspects of farming.

The workshop *"Strengthening the links between knowledge and innovation in Europe"* on 6-7th October in Angers is providing an opportunity to identify the key features of a European agricultural knowledge system. The workshop aims at reviewing the ways the links between knowledge and innovation are organised in Europe, to analyse motives and consideration for such organisation and to share experience from important reforms in several European countries in order to identify potential « best practices ».

The stakes are high: how to maintain a sufficient level of technical and scientific level among actors in order for them to respond to global and local changes and to enhance their entrepreneurial skills; how to orient development work and to link it to continuous education of the actors; how to conceive a new CAP that is supported by strong innovation systems in agriculture.

There is a variety of organisational models to strengthen links between knowledge production and use. Linear and non linear models coexist. Leading roles can be taken by researchers, professionals, civil society organisations or governments in a variety of institutional arrangements. The place of research organisations and the ways they interact with other players also differ from one model to the other. There is a need for a typology of these models and for identifying good practices.

In addition it is necessary to reflect on the respective roles of public and private organisations in linking knowledge to innovation as well as on the regional dimension, taking account of regional dynamics on that matter. The case of new member states should also be examined thoroughly.

The conclusion of the workshop will be fed into the SCAR process and will be mobilised by SCAR in its dialogue with the Commission and the Member States.

The Commission intends to pursue work in this domain through SCAR, in order to identify the agricultural knowledge structures in each Member State and discuss possible ways forward perhaps through the initial formation of a CWG.

In this context, the European Network for Rural Development, as laid down by Article 67 of Council Regulation (EC) No 1698/2005, constitutes a suitable forum to address technology transfer, as part of the improved implementation of rural development programmes. The Commission is currently assessing the possible ways to feed "Research and innovation" into the agenda of the network, notably in a 2009 seminar looking at innovation for the new environmental challenges.

Furthermore, since advisory and extension services would play a significant role in the development of any future European agricultural knowledge system, the Commission intends to take into account the findings of the SCAR in this area in its report on the Farm Advisory System, which must be submitted to Council by 2010.

4.4. Consolidating joint research programming

In the light of the ERA-Net scheme, Member States have slowly started to rethink previously isolated national approaches towards new cross-border challenges in all research fields. The recent Communication of the Commission *"Towards Joint Programming in Research"*[20] foresees a new impetus towards a more strategic approach to the coordinated programming of public research within the ERA.

Joint programming is expected to be implemented in a strategic manner, to address major societal challenges, selected according to commonly shared criteria and implemented under an agreed flexible governance structure. Joint programming should also be complemented by common or compatible methodologies for monitoring, evaluation and impact assessment.

The SCAR Committee has proved to be *de facto* the reference framework for a more coordinated approach to programming of public research in agriculture and could play an important role in this new Joint Programming process.

The development of effective and coordinated long-term programming in agricultural research should be based on a coherent strategy that will allow a regular consultation of all research actors in the framework of the wider Ljubljana process for governance of the ERA.

In that perspective, the strategic role of the SCAR Committee could be further strengthened in order to become the strategic oversight body supervising the various agriculture-related efforts carried out by all European public research bodies, and also facilitating dialogue with related

[20] COM(2008) 468 final, 15.07.2008

stakeholders in Technology Platforms who are involved in the definition of common visions and strategic agendas in similar research fields.

In this respect, an informal Competiveness Council meeting held on 17 July 2008 in Versailles under the French Presidency had food and agriculture as one of four main issues facing society today. It highlighted the need for a shared vision based on a "true scientific partnership policy" between private and public sectors and on the establishment of an "Alliance" of research organisations alongside SCAR and Technology Platforms (ETPs). The Council also stressed that the new Joint Programming framework offers an opportunity for agri-food research, and that a comprehensive international initiative for food security would be useful. It also stressed that that there was a clear need for increased budget and better articulation between research priorities and the CAP.

4.5. Developing an inter/multidisciplinary and more systems-oriented research effort

The complexity of the challenges necessitates broader, interdisciplinary research efforts, involving disciplines from outside the traditional and established approaches. It also calls for a careful analysis and mitigation of all negative cost factors and externalities involved with the implementation of any sustainable development actions.

A wide variety of technologies must, therefore, be used and, mind sets changed in order to address the broader challenges found in areas such as social sciences, demographic developments, consumer confidence, and end-user orientation of research.

Policy has to analyse the predominant bottlenecks and put the necessary administrative corrections into place to make the research systems fit for purpose. Higher education and research training schemes have to be adapted to the new demands, as highlighted by the workshop in Angers.

4.6. Developing a foresight monitoring capacity

Thinking ahead during times of rapid change is essential so that better informed decisions can be taken. Considering the dynamics of change it is clear that a one-off foresight exercise is not sufficient and that a mechanism is needed to allow regular review of past decisions and to provide information to support the decision-making process in the light of new challenges.

The establishment of a monitoring mechanism based on a regular surveying of on-going foresight would provide a better understanding and insight into existing and new trends and allow the Committee and the agricultural research community to clearly anticipate the challenges and problems that we may face in the years to come, and to come up with practical solutions.

The major objective of the monitoring mechanism would be (i) the provision of a systematic approach for identifying potential threats, opportunities and likely future developments of importance to European agriculture, and (ii) to highlight the possible implications of such developments for future research policy orientation at European and Member States levels.

The SCAR WG was mandated by the SCAR-Plenary in December 2007 to further develop the frame for the development of the suggested mechanism. For that purpose the SCAR-WG set up a specific "SCAR foresight group" (SCAR-FG) which will be supported by contracted experts in). The Commission will contract up to on the following terms of reference. In addition experts from selected EU foresight-projects will be invited to give input and attend the meetings.

As a first implementation step, a second foresight expert group, a "Consultancy Expert Group" (CEG) of 5 independent experts was contracted by the Commission to scan what has been happening in the foresight area since the work carried out by the FEG. The group will conduct a more strategic approach on the implications of foresight for 4 topics (2 thematic + 2 cross-cutting) and provide advice to SCAR on the concrete issues to be addressed by research in the medium to long terms.

Agriculture/climate change/environment/health	Thematic
Agriculture/energy/biomass/green chemistry	
Agri-policy/rural areas	Cross-cutting
Agricultural knowledge systems	

4.7. Developing the international dimension of the European agro-food research

In June 2007, the two back-to-back conferences *"Towards Future Challenges of Agricultural Research in Europe"* 26-27 June 2007 organised by the SCAR, and *"Agricultural Research for Development (ARD) in Europe: towards a shared vision"* 28-29 June 2007 organised by the ERA-ARD project[21] clearly showed that:

- Some of the emerging global challenges for Europe identified by both conferences are the same, e.g. climate change, bioenergies, food security. They both stressed the need for international agricultural research (AR) activities and cooperation to address them.

- The two conferences also questioned the way agricultural research (AR) is implemented in order to improve its impact for Europe and developing and emerging economy countries (DEEC). In particular, the necessity to involve farmer organisations, private sector, and end-users in the definition, implementation and monitoring of research activities.

As a result, it was concluded that there is a progressive convergence of AR for DEEC and AR for Europe, and Europe should improve the coordination between the two, which are insufficiently linked. Addressing this issue is precisely the objective of the ERA concept which the Commission is actively promoting. Therefore, the Commission proposed to SCAR, EIARD and ERA-ARD to explore how Europe and DEEC could benefit from European synergies in the area of international AR, while at the same time developing the European contribution to the international agricultural research agenda.

In this context the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) provides important analysis and proposals for action.

SCAR, EIARD and ERA-ARD then agreed to set up a Task Force to draw recommendations to foster complementarity and synergies between AR for DEEC and AR for Europe.

The mandate of the Task Force does not cover the whole European international agricultural research area, since it does not address collaboration with industrialised countries, like USA and

[21] ERA-ARD is an FP6 Project of the European Commission's ERA-NET Scheme

Australia, but with DEEC, and the Mediterranean neighbouring countries which are considered as part of the emerging economy countries.

In order to create synergies between European AR agendas for EU and DEEC, the Task Force was assigned with:

- Identifying research themes of common interest
- Analysing barriers for closer coordination
- Proposing modalities for closer collaboration

The Task Force recommended that a policy framework for international agricultural research to foster and facilitate coherent research activities and partnership should be established.

Such a framework would allow research cooperation addressing common research priorities (climate change, bioenergy, food security & safety); supporting agricultural research and education platforms open to European and DEEC scientists and students; sharing information on European policies, programmes, funding instruments and opportunities, and activities related to international agricultural research; better communicating about the contribution that European agricultural research can deliver for the Millennium Development Goal.

To ensure the coherence of such a framework, synergies within and outside Europe must be strengthened. From an EU perspective, there is a need to enhance synergies with other EU external policies such as development aid and the European Neighbourhood Policy. Worldwide, Europe should take a more active approach to defining the global R&D agenda in international organisations (UN agencies, World Bank, OECD, G8) and multilateral fora (African Union, ASEAN, Mercosur) and agricultural research global actors (GFAR[22], CGIAR[23]).

In this context, the international mandate of SCAR could be further strengthened in line with contributions from the European Initiative on Agricultural Research for Development[24] (EIARD) which should reinforce its coordinating role of Commission and MS supports to agricultural research targeting the needs of DEEC, and the ongoing ERA-NET *ERA-ARD*.

[22] Global Forum on Agricultural Research

[23] Consultative Group on International Agricultural Research

[24] COM(97)126 “The European Initiative for Agricultural Research for Development (EIARD)”

Annex 1 – Co-ordination between research funders in the domain of agriculture related research in the EU

- This *co-ordination table* gives an overview of coordination activities in Europe. This is about the co-ordinated development of research agenda's (which should be distinguished from co-operation in Europe, which is about common research projects)
- co-ordination can have different forms:
    - industry led *technology platforms* where stakeholders discuss the long term research agenda and commitments
    - ERA net EU subsidized projects for the co-ordinated development of the research agenda and long term cooperation in it
    - Working groups, started on the initiative of one country where others can affiliate with
- the table aims at being as complete as possible, sometimes it is somewhat arbitrary to decide if a certain activity is within SCAR's domain or not
- the table reflects the *layered research agenda*: issues, themes and programmes
- the table is regularly updated and placed on the SCAR website

Issues (main issues in society)	**Themes (balanced portfolio within issues)**	**Programmes (addressing problems and chances)**	**On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG**
food	**food quality**	food chain and network management	- ERA-net CA on Food Safety Research Programming (SAFEFOODERA) http://www.safefoodera.net/ - TP Food for Life http://etp.ciaa.be/asp/home.asp - Expert Group on FOOD and HEALTH research (KBBE-Net)
		analysis, detection and control, including validation and standardisation of testing and evaluation methods	
		feed quality	
		traceability, certification	- ERA-Net SSA on identification of emerging risks in the field of food production (PERIAPT) http://www.periapt.net/default.aspx
		endocrine disruptors	
		residues	
		food processing	
	nutrition and health		- CWG Adaptation of Human Nutrition to Environment Evolution (FR)
		food patterns and health	
		functional foods	

[25] http://www.cordis.lu/coordination/era-net.htm and http://cordis.europa.eu/coordination/projects.htm (projects overview and description)

[26] http://cordis.europa.eu/technology-platforms/home_en.html and ftp://ftp.cordis.europa.eu/pub/technology-platforms/docs/ki7305429ecd.pdf (status report May 2006 with a brief description of all platforms and their products

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		nutrigenomics	
		proteomics	
		personal diets	
		nutrition and allergies	
		metabolomics	
	food technology	safe and efficient food processing	-Networking, coordination, cooperation and integration of national RTD Programmes in the field of the sustainable enterprise SUSPRISE http://www.susprise.net/
		waste management	
		energy saving processes	
		catalysis	- ERA NET CA Applied Catalysis http://www.acenet.net/
		packaging	
	food security	global food systems	- ERA-NET SSA Research programmes in water science and technology for the developing world http://www.oieau.fr/eranet/
sustainable agriculture			- CWG Agriculture and sustainable development (FR) - CWG Common research agenda for EU rural policy (SE-NL) - ERA-NET proposal "RURAGRI" in negotiation
	crop production	integrated crop management	- TP Plants for the Future
		arable and horticultural crop ecology	
		arable and horticultural crop commodity storage	
		arable and horticultural crop genetic improvement and breeding	
		plant genetic resources	
		plant varieties and seeds	
		phytosanitary policy, plant health, statutory plant harmful organisms	- ERA-NET EUPHRESCO http://www.euphresco.org/
		plant health	
		development of draught and disease resistant crops	
		improved crop protection	
		precision farming	- TP Manufuture, http://www.manufuture.org, collective initiative: Agricultural Engineering and Technologies - CWG and ERA-NET in negotiation: ICT and robotics in agriculture

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		alternative disease control strategies	
		high quality plants (with more essential macro- and micro-nutrients)	
		low input crop systems	- ERA-NET Core-Organic, http://www.core-organic.org/
		coexistence	
	sustainable livestock farming	agro-biodiversity	
		improving production efficiency	
		grass based livestock production	- CWG Sustainable Livestock production from grassland (IE)
		improving milk and meat quality	
		optimising nutrient efficiency	
		farming systems	
		reproduction	- Farm Animal Breeding and Reproduction Technology Platform (FABRE-TP) http://www.fabretp.org/
		embryology	
		disease prevention	
		disease resistant breeding	
		animal manure management	
		management and use of animal residues	
		animal genetic resources	
		microbial genetic resources	
	animal health and welfare		- ERA-NET CA Towards Sustainable Integration of Animal Welfare in Food Production (ANIMAL WELFARE) http://www.welfarequality.net/everyone - TP European Technology Platform for Global Animal Health (GAH) - CWG Animal welfare (UK) - ERA-NET EMIDA http://www.emida-era.net/
		disease detection	
		new diseases	
		vaccine development	
		vaccine production	
		antibiotics resistance	
		animal infectious diseases (incl. zoonoses)	

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		parasitology	
		biosecurity	
		pet animals	
		experimental animals	
	organic farming		- ERA-NET CA on organic food and farming (Core Organic) http://www.core-organic.org/ - Organic research technology platform, organised by the IFOAM EU group (to be launched soon)
	multifunctional farming systems		
	transport	agro-logistics	- ERA-CA Net on transport http://www.transport-era.net/ - ERA-NET ROAD – Coordination and implementation of Road - Research in Europe http://www.road-era.net/ - TP ERTRAC European Road Transport Research Advisory Council - TP ERRAC European Rail Research Advisory Council - TP water transport research http://waterborne.balport.com/
		tracking and tracing	
		product quality preservation	
		invasive species	
		gps	
		animal welfare	
	energy		- Innovative Energy Research http://www.inner-era.net/ (under construction) - CWG "agriculture-energy-interface"
		bioenergy	- ERA-NET CA on Bioenergy http://www.eranetbioenergy.net/website/exec/front - ERA-NET CA to Establish a Hydrogen and Fuel Cell ERA-Net, - Hydrogen Coalition (HY-CO) http://www.hy-co-era.net/ The European Hydrogen and Fuel Cell Technology Platform (HFP) - ERA-NET CA Networking and Integration of National and Regional Programmes in the Field of Photovoltaic (PV) Solar Energy Research and Technological Development (RTD) in the ERA (PV-ERA-NET) http://www.pv-era.net/cms01/showlinx.asp?lang=e
		wind parks	

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		energy saving technologies	
		CO2 emission reduction	
		smart transport systems	
		energy saving in food processing	
natural resources			- ERA-NET CA Scientific Knowledge for Environmental Protection http://www.skep-era.net/site/50.asp - CWG Ecology for ecosystems & natural re-sources sustainable management (FR)
			- The European Polar Consortium http://www.europolar.org/pages/1/index.htm
	water	sustainable water management for agriculture and ecosystems	- TP Water Supply and Sanitation Technology Platform (WSSTP) Towards a European-wide exchange Network for improving dissemination of Integrated Water Resources Management Research outcomes http://www.wsstp.eu/site/online/home
		water framework directive	- Towards a European-wide exchange Network for integrating research efforts on Integrated Water Resources Management http://www.iwrm-net.org/
		water quality	
		aquatic habitats	
		flood prevention and management	- ERA-NET CA on Flood risk management (CRUE) http://www.crue-eranet.net/
	air	agriculture and air quality	
	soil	soil quality	- ERA-NET CA on sustainable management of soil and groundwater under the pressure of soil pollution and soil contamination (SNOWMAN)
		soil management and conservation	
		soil quality, ecology and function	
	biodiversity	agrobiodiversity	
		animal biodiversity	

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		plant biodiversity	- An ERA-NET in Biodiversity Research (BiodivERsA) http://www.eurobiodiversa.org/
		ecological networks and corridors, including defragmentation	
		nature conservation	- ERA-NET Networking and Integration of National Programmes in the Area of Wood Material Science and Engineering http://www.woodwisdom.net/
		Convention on Biological Diversity	
		marine resources	- ERA-NET CA Co-ordination of National and Regional Marine RTD Activities in Europe (MarinERA) http://www.marinera.net/
			- ERA-NET European Consortium of Ocean Research Drilling (ECORD) http://www.ecord.org/
	climate change	inpact of climate change on agriculture, including adaptation and mitigation strategies	- ERA-NET SSA Climate Impact Research Co-ordination within a Larger Europe (CIRCLE) http://www.circle-era.net - CWG "Agriculture and climate change"
		inpact of climate change on agriculture	
		biodiversity	- An ERA-NET in Biodiversity Research (BiodivERsA) http://www.eurobiodiversa.org/
		invasive species	
		climate change models and forecasts at both global and regional level	
		climate change monitoring, detection, attribution	
rural development	**rural economies**	threats	- CWG and ERA-NET under negotiation ´Sustainable Agriculture and Rural Development`
		demographic changes	
		community structure	
	multifunctionality	urban-rural interactions	
		green services	
		land management	
		conservation of (national) cultural heritage	
		recreational functions of landscape	

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
		value of public goods	
		land use policy	
	social cohesion		
support to policies	**CAP**	cross compliance monitoring in EU member states	
		market analysis and models	
		New technical developments in the field of controls of direct payments	
	EU Directives	quantification of cost and benefits of environmental policies	
		water framework directive	- Towards a European-wide exchange Network for integrating research efforts on Integrated Water Resources Management http://www.iwrm-net.org/
		habitat directive	
		Sustainable Soils Directive	- ERA-NET CA on sustainable management of soil and groundwater under the pressure of soil pollution and soil contamination (SNOWMAN)
		services directive	
	agri-environment schemes		
	international trade and treaties		
	European integration	new countries	- Southeast European ERA-NET CA http://www.see-era.net/index.html
	foresights		- Transnational Foresight ERA-Net CA http://www.eranet-forsociety.net/ForSociety/
	natura 2000		
	bioterrorism		
biobased materials	**non-food utilization of agricultural products**	plant based vaccine production	
		renewable industrial materials	- ERA-NET CA Networking and Integration of National Programmes in the Area of Wood Material Science and Engineering http://www.woodwisdom.net/

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
			- CWG Renewable Raw Material for Industry (DE)
		bio-energy	- ERA-NET CA on Bioenergy http://www.eranetbioenergy.net/website/exec/front
		bioplastics	
		colorants	
		cosmetics	
		fiber materials	
key technologies	**ICT**		- ERA-NET CA ICT in traditional manufacturing ETRANET http://www.etranet.net/index.cfm
		tracking and tracing systems	
		identification and registration systems	
		robot technology	- CWG ICT and robotics in agriculture (DK) ERA-NET in nogotiation
		precision agriculture	
	genomics		- ERA-NET CA on plant genomics (ERA-PG) http://www.erapg.org/everyone - ERA-NET CA on societal aspects of genomics ERA-SAGE http://www.erasage.org/
	proteomics		
	biotechnology		- Technology Platform on Sustainable Chemistry (with a white biotechnology sub-section) - ERA-NET CA Trans national collaborative RTD for SME's projects in the field of biotechnology http://www.eurotransbio.net/ - Towards an ERA in Industrial Biotechnology ERA-IB http://www.era-ib.net
		marine biotechnology	- CWG on Marine Biotechnology
		array technology	
	(bio) nanotechnologies		- TP ENIAC - European Nanoelectronics Initiative Advisory Council - ERA-NET CA Nanoscience in the European Research Area http://www.nanoscience-europe.net/ - ERA-NET CA From micro and nano-scale science to new technologies for Europe http://www.mnt-era.net/home.html
	space		- TP ACARE - Advisory Council for Aeronautics Research in Europe

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
			- TP The European Space Technology Platform (ESTP)
		gps (animal transport)	
		earth observation and remote sensing for monitoring and management	- ERA – Space Technologies Applications & Research for the Regions and medium-sized Countries http://www.era-star.net/ShowPage.aspx?tabId=-1
	separation technologies		
	emerging technologies	bioencapsulation	
	system biology		- CA Towards a European Research Area for Systems Biology http://www.erasysbio.net/
fisheries research			- ERA-NET for the Baltic Sea science - network of funding agencies Era-Net (BONUS) http://www/bonusportal.org/ - ERA-NET fisheries research (MARIFISH) http://www.marifish.net/ ERA-Net SSA Control objectives and shellfish target assurance levels
forestry research			- TP Innovative and Sustainable Use of Forest Resources
research policy	**research infrastructures**		- CWG "Shared infrastructures for European agro-food research"
	mobility		
	research for development		- ERA-NET CA Agricultural Research for Development (ERA ARD) www.era-ard.org
	cooperation with (small and medium size) enterprises		- ERA-NET CA on National and Regional Programmes to Promote Innovation Networking and Co-operation between SMEs and Research Organisations (EraSME) http://www.era-sme.net/public/ - ERA-NET CA shared knowledge base for sustainable innovation policies - ERA-NET CA National and Regional Programmes and Incentives dedicated to the creation and support of Competence Research Centres - - COMP ERA-NET http://www.comp-era.net/default.aspx - ERA-NET CA SME's collective research CORNET http://www.cornet-era.net/
	coordination of national research programmes		

Issues (main issues in society)	Themes (balanced portfolio within issues)	Programmes (addressing problems and chances)	On-going coordination activities (ERA-Nets[25], Technology Platforms[26]) and collaborative working groups CWG
	foresights		- ERA-NET CA Transnational Foresight http://www.eranet-forsociety.net/ForSociety/
	research knowledge base		
	better knowledge use/ knowledge circulation		
	support for innovation		- ERA-NET CA Shared knowledge base for sustainable innovation policies VISION http://www.visioneranet.org/
	miscellaneous	European young investigators awards European policy co-operation of women in science European science education network 2003 INternational COoperation on Science and Technology NETwork	- European Policy Co-operation of Women and Sciences (EOWIN) - Coordination of research between Europe and China www.co-reach.org - CWG Relevant Issues for Mediterranean agriculture (IT) - ERANET "ARIMNet" in negotiation

Annex 2 – SCAR Collaborative Working Groups

ICT and Robotics in Agriculture and related Industries

The aim of the CWG is to shape and focus the research and development on ICT and robotics for agricultural-related industries and provide a basis for MS collaboration. It brings together existing networks and the technological companies, achieve critical mass, and provide optimal conditions for the European work in ICT and robots for agriculture and related industries. The CWG worked out a matrix outlining the R&D topics on the relevant field within the next decade, with the aim to identify missing technology links in the chain from farm to fork. A mapping report is also being updated. A questionnaire will be drawn up to explore the future work of the group regarding the interest in joint proposals, a closer and formal collaboration and/or an ERA-net proposal. The CWG is coordinated by Denmark and involves 11 countries.

Renewable Raw Materials and their Application in Non-food Industries

The objective of the CWG is to set up a co-ordination strategy for systematic information exchange on national R&D programmes in the field of renewable resources. To achieve this goal an ERA-Net is envisaged although several participating countries do not have an appropriate ongoing R&D programme in this field. In order to avoid overlapping and promote synergies with already existing initiatives (e.g. ERA-Net ERA-IB), the proposal may focus on the field of biobased and biodegradable materials or biogenous lubricants. The collaboration with the Agency for Renewable Resources (FNR) will also be ensured. The CWG is coordinated by Germany and involves 18 countries.

Animal Health (& Welfare)

The purpose of the CWG is to provide a forum leading to improved collaboration on research prioritisation and procurement, creating the necessary critical mass and focus to deliver the animal health research needs of policy makers and the European livestock industry. To achieve this goal, the CWG identified five Pilot Theme Areas (Epidemiology and Risk, Immunological Control, Alternative control, Animal Welfare and Therapeutics) and established the process for the capture of information on ongoing research activities in these fields, mainly through a searchable database system. The group also explores the possibilities of developing collaborative activities on the detection/prediction of emerging disease threats and of mapping research infrastructure of pan-European interest. The CWG is coordinated by UK and involves 21 countries.

Relevant Issues for Mediterranean Agriculture

The aim of the CWG is to enhance scientific cooperation between EU MS and other countries of the Mediterranean area thus addressing common agricultural problems, e.g. the use and management of natural resources, such as soil and water, crop protection and threats to the security and sustainability of agricultural production resulting from climate change. The CWG intend to submit an ERA-NET project within the first FP7 call. The CWG is jointly coordinated by Italy and France and involves 11 countries.

Agriculture and Sustainable Development

The establishment of the CWG builds upon the « Agriculture et Développement Durable » programme (ADD) which aim to support over 2005-2009 interdisciplinary and innovative work in the field of agriculture and sustainable development. The CWG started its work by exchanging information on national research activities and programmes and exploring the possibilities for further cooperation, with a view to the submission of an ERA-Net project. To achieve this goal, the participants started to map national research programmes, systems and infrastructures, and reflected on the scope and the structure of a possible ERA-net proposal. The CWG is coordinated by France and involves 11 countries.

Sustainable livestock production from grassland

The aim of the CWG is to make an inventory of current grassland research capacity and infrastructure, identify gaps and priorities for collaboration in that field. Each of the participating countries have provided information relating to the relevant research programmes ongoing in their countries, the resources involved and the priorities for future research. This information will be collated and presented as a report to SCAR early in 2007. The CWG is coordinated by Ireland and involves 12 countries.

Ecology for Ecosystems and Natural Resources Sustainable Management

The establishment of the CWG builds upon the ECOGER programme led by INRA which aim to produce over 2005-2008 new scientific knowledge of ecological processes, in order to develop innovative tools to meet the needs of policy makers, managers and users of rural and peri-urban spaces. The activities launched by the CWG concern information exchange and mapping on national programmes, funds and scientific teams from participating countries, and identification of scientific topics which could lead to an ERA-Net proposal or a COST action. The CWG is coordinated by France and involves 8 countries

Adaptation of Human Nutrition to Environment Evolution

The establishment of the CWG builds upon a programme led by INRA, which focuses on two main areas of Human Nutrition: (i) nutritional adaptation to the evolution of eating patterns, life styles and environment and (ii) nutrition and health, including wellbeing and disease prevention. The CWG started its work on a bottom-up co-operation mode by exchanging programme relevant political and scientific keywords in order to facilitate the analysis of common interests of the partners. At later stage - after the definition of joint items - a trans-national programme co-ordination e.g. by means of an ERA-NET is envisaged. Particular attention will be given to a strategy which avoids overlaps with other networking and coordination initiatives. The CWG is coordinated by France and involves 10 countries.

Advanced Technologies for Climate Control of Greenhouses and Livestock Housing

The objective the CWG is to create a multidisciplinary platform for knowledge transfer and cooperative research on climate control of greenhouses, and housing of livestock and aquaculture for high and sustainable production, under both hot and cold climatic conditions, with emphasis on advanced technologies. The activities of the CWG are mainly based on the screening and identification of R&D gaps, ongoing national research programmes and relevant infrastructures and capabilities. These activities are expected to lead to an ERA-Net proposal or a COST action. The CWG is coordinated by Israel and involves 14 countries.

Development of Sustainable Agriculture in the Baltic Sea Region

The objective the CWG is to specify factors determining the development of sustainable agriculture in Baltic Sea Region, through the use of innovative technologies. At the kick-off meeting the participants presented the work being done in the different countries in the region and discussed ideas and visions with stakeholders in order to develop coordinated strategies towards a more sustainable agriculture in the region. The CWG is coordinated by Poland and involves 8 countries.

Common/coordinated research agenda for EU rural policy

This CWG is the result of a merge of two similar proposals suggested to SCAR in 2005 and consolidated as one proposal at the SCAR June 2006 meeting. The CWG aims to identify relevant long-term research questions related to rural policy as well as an overview of the current activities and state of the art knowledge. At the kick-off meeting, a number of core topics were identified. A document based on these discussions and other input will be produced to be ready for early spring and as input for a second consultation meeting scheduled early 2007. Discussions with CWG on “Agriculture and Sustainable Development” has been started to identify differences and potential common grounds. These discussions will be continued during spring 2007.

Climate Change and Agriculture

The objective of this CWG is to bring together research funding organisations in the Member and Associated States, in order to coordinate research activities among the European countries at the climate change and agriculture interface. This will consider how climate change affects agriculture, and how agriculture could be adapted to climate change (including mitigation of agricultural impacts on climate change).

Agriculture-Energy-Interface

The objective of this CWG is to elaborate the co-ordination needs for research funding at the interface between agriculture and energy in the broadest sense (“holistic approach”) covering not only the scientific-technological

challenges for biomass and bioenergy production, but also the industrial, ecological, socio-economic and rural dimension of the subject.

Shared infrastructures for European agro-food research

This CWG aims to identify the future needs of agricultural research and design new models of governance in order to share infrastructures efficiently at a European scale.

Annex 3 – Agri-food research systems in European countries: overview

The following section has been compiled from the country reports and summaries made by the EU AGRI MAPPING project.

AUSTRIA

Agri-food research is undertaken by around 17 main research players including federal offices, research institutions as well as 2 universities. The capacity can be considered fragmented and no major changes are expected in the future. Public agri-food research is coordinated by fairly concentrated funding and programming. Regarding research topics, an emphasis is given to sustainable development and environmental issues.

BELGIUM

Agri-food research is mainly implemented by 2 public research organisations and a network of universities. A characteristic of Belgium research system is its high level of fragmentation with a limited coordination at federal level. There is a trend for the merging of universities at regional level and for a reinforcement of the link between research and industry through the creation of competitiveness clusters. The thematic orientations are consistent with those of neighbour countries, with an emphasis towards systemic approaches, environmental issues and the development of knowledge-based bioeconomy.

BULGARIA

Most of the research organisations involved in agri-food research is public research institutes. The capacity is scattered in 14 national agencies, 28 institutes and 6 universities. Agri-food research seems poorly coordinated and there is no official long-term strategy. Research topics relate mostly to agricultural production and rural development issues with a special emphasis on plant and animal science and biotechnology. Consumer-oriented research, climate change and energy are not indicated in the recent research trends.

CROATIA

There are 13 main organisations involved in agri-food research with 8 main governmental research institutes and 5 universities. Considering the size of the country, the capacity can be considered fragmented. Public agri-food research is coordinated by fairly concentrated funding and programming. A particularity of Croatian research is the importance given to fish products. Research on alternative use of agricultural production seems poorly covered.

CZECH REPUBLIC

The research capacity is scattered in 22 research institutes and 9 universities. There is no plan for restructuring the research capacity. There are 2.400 researchers involved in the agri-food sector. Research seems rather well coordinated with the adoption of a national research programme since 2003 and the increase share of projects funded on a competitive basis. Regarding research topics, a particularity is the importance of plant & animal science, environment, food safety and forestry. Biodiversity, alternative use of agricultural production and rural development issues are in focus.

CYPRUS

Cyprus is a small country with the Agricultural Research Institute being the main actor. On-going changes in this institute as well as the opening of a technical university in September 2007 may change the landscape. The total number of researchers is below 100. Given the limited capacity of Cyprus, some major research themes (for example animal science) are not covered. Emphasis is given to the protection of the environment and rural development issues, technologies for the productions and the management of water.

DENMARK

The organisation of research is in a transition phase with the integration of research institutes into universities (from January 2007) and the merging of universities. There currently 3 main universities involved in agri-food research. Regarding research topics, a particularity is the focus on the integration of new technologies (ICT, nanotechnology) into agri-food research and the emphasis to consumer-oriented approach. Agri-Food research has also shifted focus from productivity and primary production to a more holistic approach including environment and product quality.

ESTONIA

Agri-food research is implemented by 9 main organisations including 3 universities, 4 public research organisations and 3 private research institutes. The total number of researchers involved in agri-food research is estimated around 250. The capacity and the coordination of research are fairly concentrated, main actors being the universities and

Estonian Research Institute for Agriculture. There is a national programme for applied agricultural research. Research topics addressed by Estonian researchers relates mostly to issues related to agricultural production (food safety, animal and plant science) and rural development. Recent challenges (biodiversity, alternative use of agricultural production) are identified as important topics for future research.

FINLAND

The Finnish agri-food research landscape is characterised by the importance of the forest sector. There are around 16 organisations involved in agri-food research gathering both universities and research institutes. During past years, there has been a concentration of the capacity with the integration of institutes into MTT Agrifood research Finland. The capacity is considered fairly concentrated. Finnish agri-food research is much internationalised and the focus on the bio-economy appeared in 2005. Adaptation to and mitigation of global warming is also among the top priorities of Finnish research programmes.

FRANCE

The capacity is concentrated with more than 11.000 employees in 4 public research institutes supervised by the ministries of agriculture and of research. In total, there are around 10 majors players. Besides the small number of organisations, the important number of units and centres indicates a scattering of the capacity. A particularity is the low importance of universities (high education for agri-food is delivered by colleges). Links between education and research are being strengthened with the creation of clusters. Regarding research topics, there has been a shift of focus from productivity and primary production towards quality, environment, biogenomics and a more systemic view of the agri-food sector.

GERMANY

Public agri-food research is organised in 3 levels: at federal level (8 research centres), at federal & state level (11 organisations & foundations) and at state level (14 faculties and 31 research institutes). Reorganisation of the capacity is with the gathering of research institutes at federal level took place in 2008 and the creation of clusters at state level. There is an apparent need for coordinated capacity management. The focus of research includes a wide range of topics including quality issues, environmental issues, sustainable development, agri-non-food chains, climate changes etc.

GREECE

Agri-food research is carried out by an important number of organisations including 6 universities, 7 educational institutes and about a dozen of research institutes. The capacity is fragmented and there are plans to reduce the number of units. Restructuring the current research system is considered an urgent priority. Regarding research topics, there has been a shift from productivity and primary production towards new challenges (sustainability, biodiversity, bioernergy etc.).

HUNGARY

The Hungarian agri-food research landscape comprises 6 research institutions belonging to the Hungarian Academy of Science, 11 Universities, 11 institutes or companies belonging to the Ministry of Agriculture and Rural Development, and several other research institutions and private companies. The capacity is fragmented and there are plans to merge and privatise research institutes. Research topics focus mainly on production issues (animal science, agricultural and food technology) but more recent topics such as alternative use of agricultural production or biodiversity are also in focus.

ICELAND

Agri-food research is implemented by 2 universities, one college, one research institute and one research company. Given the small size of the country, the capacity is fairly concentrated. The education and research system is currently experiencing important changes with the strengthening of competitive funding, involvement of industry and cooperation with universities. Regarding research themes, quality, productivity, environmental sustainability and biodiversity are in focus.

IRELAND

The most important research player in Ireland is Teagasc, the Irish national agriculture and food development authority. Research is also carried out in universities (7) and institutes of technology. Public agri-food research is shattered over an important number of rather independent and uncoordinated performers. A major focus of the thematic area is molecular biology and nanotechnology as the country embarked into a development of a “bio-based economy”.

ISRAEL

The agri-food research capacity is fairly concentrated with one major research player and 5 faculties and institutes. Concerning research topics, there is an emphasis on biotechnology and on issues related to the use of natural resources and to environmental aspects of agriculture. A particularity is the importance of research related to water and irrigation issues (management, utilisation, pollution and quality).

ITALY

The Italian agri-food research system is very fragmented with the involvement of 6 Ministries, 1 funding agency, 6 national research organisations (gathering more than 30 research institutes), 23 universities involved in agronomy and veterinary science and another 20 research institutes not specialised in agri-food. Research trends indicate a focus on biotechnology and traditional research – recent challenges such as climate change, energy or biodiversity were not indicated as current trends but as needs to be addressed in the future.

LATVIA

Latvian agri-food research system is rather concentrated with the major research actors being the University of Agriculture of Latvia and the research institutes of the Ministry of Agriculture. The focus of research is mainly on the competitiveness of the agri-food sector, rural development, and the management of natural resources (including forestry). Biodiversity, climate change and non-food utilisation of agricultural products are not mentioned.

LITHUANIA

Agri-food research in Lithuania is fairly concentrated with 3 universities, 2 public science institutes, 3 university–level institutes and 1 public scientific establishment. The total number of researchers is estimated at 1780. Agri-food research seems rather well coordinated with the implementation of long term research strategy since 2003. Agri-food is among the first research priorities of Lithuania as reflected by its rank in the GBAORD (3rd position) and its share of the total budget (18%). The themes covered by the Lithuanian researcher community encompass traditional agricultural research, genomics and biotechnology, climate change. The emphasis on energy (biofuel, biomass) can be underlined.

LUXEMBOURG

The agri-food research capacity is fairly concentrated with three major research players. Research seem well coordinated, there is a National Research Fund with multiannual programmes. Research trends include recent challenges such as climate change, energy or biodiversity.

MALTA

With 5 main research players, the Maltese agri-food research system can be considered rather fragmented. Despite the small size of the country, the coordination of research programme seems poor as there is no long term strategy for agri-food research. Research trends indicate that the focus is mostly on traditional agri-food research. Energy, climate change or biotechnology is not mentioned.

THE NETHERLANDS

The Dutch agri-food research system is characterised by its high concentration: over the last decade, nearly all of public agricultural research, academic and professional education and knowledge transfer has been concentrated in one single organisational frame: Wageningen University and Research Centre. Besides, the university, there are 4 other major players in agri-food research. The number of researchers is estimated around 1.000. Research trends indicate a large coverage of issues including recent challenges such as climate change, energy or biodiversity.

NORWAY

With 15 organisations involved in agri-food research, the landscape can be considered rather fragmented. A characteristic is the importance of aquaculture (7 organisations) and forestry (4 players). There are around 1900 researchers. Despite the important number of organisations for the size of the country, agri-food research can be considered well coordinated (the Research Council of Norway was founded in 1993). Agri-food research has shifted its main focus from productivity and primary production to a more holistic approach including environment and product quality, and emphasis has moved to the consumer-oriented, final stages of the food chain.

POLAND

There is an important number of organisations involved in agri-food research with 9 universities, 7 centres under the Ministry of Agriculture, 2 under the Academy of Science and others independent research entities. Research trends indicate a wide coverage of issues related to agricultural production, environment, rural development or energy. Poland is also characterised by the important place of food technology research. Consumer-oriented research, climate change and agro-food biotechnology research are not indicated in the trends.

PORTUGAL

Agri-food research is rather fragmented but the sector is under-going important changes with a trend for a concentration of the research capacity. In 2006/07, the research landscape comprises around six research organisations, eight universities and seven colleges. An interesting initiative is the systematic assessment of the Portuguese research system by panels of international experts. Concerning research topics, it seems that there is a relative decrease of classical agricultural research and a trend for more research on technology oriented topic.

ROMANIA

The agri-food research landscape is composed of 4 universities (dedicated to agri-food reserach), 14 research institutes and 4 research centre and other units belonging to the Academy of Agricultural Science and Forestry, 3 institutes under the Romanian Academy and 1 institute under the Ministry of Agriculture and a number private research organisations. The private university "Bioterra" became a strong player in the agri-food sector attracting more agro-food students than state universities. Plans to better coordinate the agri-food research system are under discussions. Concerning research topics, the focus is mainly on traditional agricultural, biotechnology, biodiversity and rural development. Consumer-oriented research, non-food use of agricultural product and climate change are not in the focus.

SLOVAKIA

The agri-food research capacity is scattered in 8 universities and 11 research organisations employing around 1.500 researchers. Research is coordinated by the Ministry of Agriculture and there is a national research programme. Current research focus mainly on issues related to the agricultural production with an emphasis on the improvement of the competitiveness, the protection of natural resources and the utilisation of Slovakian natural resources.

SLOVENIA

The agri-food research system is coordinated by 4 Ministries. There are 4 universities, 12 governmental organisations and 2 non profit organisations involved in agri-food research. The total number of researchers is 258. Research seems rather well coordinated with the funding of projects on competitive basis through a national research programme covering a 5-year period. Current trends indicate that the major focus is on traditional agricultural research including biotechnology.

SPAIN

The Spanish agri-food research capacity is still fragmented with 4 main research organisations, 5 main universities and a network of regional agricultural research centres. A particularity is the organisation at both national (4 ministries involved in agri-food research) and regional levels. The funding of agri-food research is increasing. Spanish agri-food research used to be mostly applied but recent challenges are now among the priorities.

SWEDEN

There are four major research players in agri-food research including one leading university and 3 other institutes specialised on forest research. The other universities (13) also conduct forest research. Research is funded by public support as well as by private foundations. Most of public funding is open to competition administered by different bodies (9 in total). The agri-food research concentrates much on safe and sound food products and production. Effects on the environment from food production are also in focus.

SWITZERLAND

The agri-food research landscape comprises 3 federal research units, 7 universities and several other independent research units. A characteristic is the importance of research financed and undertaken by the private sector. The Swiss agri-food research system experienced important change in the last decade with a concentration of the research units. Regarding research topics, the focus is on organic farming and integrated production, biotechnology, climate change and energy, natural resource protection and animal welfare, food quality and safety.

TURKEY

The agri-food research landscape of Turkey is fragmented with more than 30 universities, 65 public research institutes and 10 non-profit research organisations. The research focus is mainly directed towards traditional agricultural and food research (food technology, plant breeding and biotechnology, crop production and protection, animal health and husbandry etc.).

THE UNITED KINGDOM

The number of agri-food research players is very high in the UK including a large network of universities and around 20 important research entities. Funding is managed by several council and authorities. Public agri-food

research is sponsored along two lines: the policy oriented and dedicated research by the Ministry of Agriculture on one hand and the science and technology oriented research by the research councils on the other hand. The focus of research include a wide range of topics including biochemistry, biomolecular science, climate change and energy, natural resource protection, sustainable consumption and production.