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Current practices and experiences in the area of FOOD and HEALTH Research

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Current practices and experiences in the area of FOOD and HEALTH Research

Report from the Health and Food Expert Group

Food, Agriculture and Fisheries, and Biotechnology

Directorate-General for Research and Innovation
Biotechnologies, Agriculture, Food

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CURRENT PRACTICES AND EXPERIENCES IN THE AREA OF FOOD AND HEALTH RESEARCH IN EUROPE (2008-2011)

FOREWORD

The prevention of diet-related diseases is one of the new societal challenges of the 21st century. These new societal challenges can only be tackled by a more cross-border, cross-disciplinary, integrated approach, with the participation of all stakeholders. A joint effort is necessary because of the common challenges and multiple links between the different changes population faces in Europe (aging, lifestyle, obesity). One factor makes this joint effort more opportune than ever: the economic crisis which brought about a shortage of funding both in the public and private sectors. It is necessary to achieve a European Research Area in the food and health field which will form a solid basis for any research carried out to respond to the above-mentioned challenge.

The expert Group on Food and Health research worked from December 2008-December 2011 to advise the Commission on the development of a long-term strategic approach to shaping national multidisciplinary programmes in the area of food and health at European level. Since the group was established, many initiatives – such as the Joint Programming Initiative 'A healthy diet for a healthy life' - were set up or are under development (Knowledge and Innovation Community Food4Future), proof of the interest that society has in the potential results of such initiatives. The group of experts has been able to review the practices at national level when it comes to food and health research programmes, to indentify the reasoning behind research policy decisions taken when setting up such programmes, to propose practical solutions on how to proceed and solve possible challenges encountered on the way, on how cross-border collaboration and public-private partnerships could support achieving national public health as well as competitiveness goals.

We think this report provides a very good overview of research carried out at national level in the food and health area and its conclusions can be used to define a strategy on the way forward, especially in view of synergies with the Horizon 2020 implementation. We therefore congratulate the experts on the results of the excellent work carried out beyond their job requirements and thank Mr Antonio di Giulio, Ms Agnieszka Friedrichs, Mr Tim Hall, Ms Valerie Rolland, Ms Maive Rute, Ms Laura Alexandrescu and Ms Ariane Stalpaert, our

Commission colleagues who supported the group throughout its life span. Last, but not least, we wish you a pleasant read.

Pierre Mathy
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EXECUTIVE SUMMARY

Research in the food and health area has, up to now, been predominantly characterised by fragmented national/regional programmes (technology, health, nutrition, food safety, etc.). There are limitations in the existing approaches and there is a need to develop more the cross-border aspect of public research activities at Member State regional level in order to tackle the current societal challenges in the food and health area whilst also ensuring the competitiveness of the European food and drink industry. Recognising this fragmentation, there are attempts by different actors to overcome it and to develop joint activities. The Joint Programming Initiative (JPI) 'A Healthy Diet for a Healthy Life' (HDHL), which is a broad based and member state driven initiative and a good potential approach, will attempt for the first time to coordinate research in the area of Food and Health at European level.

For the purpose of this report, experts have focused on research for prevention, and not on medical research on therapies and treatments, when considering the food and health research activities in their countries. It should be noted that this report does not include any assessment of research carried out under programmes financed at European Union level, including the 7th Framework Programme for Research and Technological Development (FP7).

Without being an exhaustive mapping exercise, this report provides an overview of how research in the above mentioned area is undertaken / supported in the different European countries as well as considering the causes of fragmentation in this field. The report acknowledges that regardless of the predefined research fields and institutional structure, boundaries exist, therefore, there is a requirement to develop a mechanism to work across them. It also proposes ways in which these boundaries could be overcome and provides good examples of where mechanisms have been developed and proposes principles that could be applied when European countries are developing their own mechanisms.

Food and health research requires financial support and institutional commitment in order to address the societal challenges that Europe faces today. This report highlights some of the more efficient and appropriate ways to achieve this.

Findings from the report:

- In most countries, the food and health research area has to respond to at least two different policy domains: Health and Agriculture, which in most cases have different needs;
- The research funding system is organised in different ways within European countries- central vs. regional, single funding body vs. many funding bodies – and this can have an impact on how research is delivered and how its outcomes influence public health and industrial policy;
- Research priorities are set at the highest level (governmental), based either on top-down or bottom-up stakeholder consultations. Research programmes are than developed by agencies or research councils often also through stakeholder consultation. However, research strategies set up in different fields (agriculture, health) may not have common goals;
- Three types of programmes supporting food and health research were identified by the group: dedicated, integrated food and health programmes, formalised or ad-hoc coordinated programmes, programmes that have among their priorities food and health;
- Multidisciplinarity is not easy to achieve with the clear distinction made between the food and health fields when it comes to policy priorities, research programmes, scientific education or publication of scientific work;
- Funding participants from other countries is often a challenge for a national programme, unless specific, time-limited bilateral (or multilateral) agreements are set up between countries. Perennial transnational programmes are only established in the Nordic countries with transnational calls implemented on an ad-hoc basis;
- As far as knowledge and technology transfer and innovation are concerned, the situation in the food and health research field is not much different than in other research fields. However, as particularities one can cite the large number of SMEs present in the food sector and the importance of consumer acceptance of new or innovative food products;
- Some examples of successful Public-Private Partnerships (PPP) in the food and health research field are included in the report. They face the same challenges as other PPPs.

There are several principles that are fundamental to a coordinated or integrated programme in the food and health field:

- Highest level agreement on the overall challenge to be addressed and a commitment to address this in a coordinated or integrated way as well as providing the necessary resources;
- Establishment of clear structures to facilitate communication between institutions and stakeholders involved in the food and in the health field;
- A common research strategy or vision and agreed common short and/or long term priorities, focusing on outcomes and impacts and taking into account different perspectives;

- Implementation of the strategy through coordinated or integrated research programmes based on flexible funding mechanisms;
- Enabling the capacities which are needed to support such types of research: researchers' skills, infrastructures and networking capabilities.

Among the advantages of having well-coordinated or integrated programmes this group has identified: better funding opportunities, increased research efficiency, ensuring multidisciplinarity and the possibility to tackle large scale challenges.

In all European countries there seems to be growing understanding that stronger transnational cooperation is needed to solve global problems. Expertise and capacities may not always be available at national level and funding needed may be beyond national resources available. If it is decided to set up transnational programmes similar principles as the ones stated above should be applied.

One way to foster knowledge and technology transfer and innovation in the food and health area is the Food4Future (Sustainable food supply chain, from farm to fork) Knowledge and Innovation Community, which could be considered a good start from this point of view. This way a strong link between actors in the research, innovation and education field could be established.

The Expert Group notes the efforts of the FoodForLife Technology Platform to provide a Strategic Research and Innovation Agenda (2014-2020) for the European food industry.

The JPI 'A Healthy diet for a healthy life' is motivated by societal challenges. The Strategic Research agenda is currently finalised.

The European Commission and Member States should further commit to actions that tackle fragmentation and support the ongoing initiatives, especially the JPI 'A Healthy diet for a healthy life' and its further development.

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BACKGROUND

The Commission through the establishment of an Expert Group on Food and Health Research sought independent expert advice[1] on the development of a long-term strategic approach to shaping national multidisciplinary programmes in the food and health area at European level.

The purpose of the Expert Group was to describe and discuss good practices in European countries including identification of challenges towards the integration/coordination of research programmes at national level and the establishment of cross-border research programmes in food and health. This information has been used to highlight some of the most important parameters that should be considered in the implementation of coordinated and integrated food and health research programmes at European level.[2]

INTRODUCTION

The Expert Group on Food and Health Research was set up in December 2008 and comprises of experts acting in their personal capacity.[3]

The group worked until December 2011 and during this time period experts shared information on how the food and health research area is structured in their own countries. It should be noted that experiences from national level were expressed and that there was no analysis of European programmes in the field.

As a first step, information from each country was provided based on a questionnaire developed by the Commission and agreed by the experts. Their individual or joint contributions are annexed to this report and cover the period March-May 2009. In some cases, updates were provided during the following period. When considering those contributions it should be kept in mind that the group's aim was not an exhaustive mapping of programmes and issues in the food and health area and that since the information was collated the situation within some of the countries may have changed.

Seven meetings were organised in Brussels within the above mentioned period. The purpose of these meetings was to give experts the opportunity to discuss and share their experiences as well as provide information of relevance regarding national and European initiatives in the area of food and health.

1 Disclaimer: Members of the Expert group are acting in their personal capacity. Opinions expressed in the document are not official Members States' positions.
2 It should be noted that this report does not include any assessment of research carried out under programmes financed at the European Union level.
3 Disclaimer: Members of the Expert group are acting in their personal capacity. Opinions expressed in the document are not official Members States' positions.

This report is based on the individual contributions and discussions during the meetings. As a result of the group's assessment some examples as good practice and some principles and mechanisms to achieve better coordination/integration in the food and health area are proposed. Both challenges and opportunities are identified as well as options for a possible way forward are given.

1. IDENTIFYING AND SETTING UP PRIORITIES IN THE FOOD AND HEALTH RESEARCH AREA AT NATIONAL LEVEL

1.1. Institutions involved

In each European country many institutions are involved in research in the Food and Health area, from the central as well as from regional level, mainly public but also private. In countries where funding seems to come solely from the central level, fewer institutions are involved (IE, LV, TR, EL, DK). Regional entities exist mainly in France, Germany, Italy and Spain. Ministries usually define the strategy and agencies, or research councils acting either as funding bodies in their own right (UK), or as agencies, are responsible for setting up the programmes and for project selection and funding. However, Ministries are also responsible for funding research in Turkey; setting up research programmes in Spain; or undertaking their own research in Switzerland and Germany (Ressortforschung). Established private funding is available in the UK (Wellcome Trust, Cancer Research UK), France (Organisation Interprofessionnelle des filières), Sweden (The Swedish Food Federation, The Swedish Retail and Wholesale Development Council– and The Swedish Farmers' Foundation for Agricultural Research), Denmark (private research fund of the dairy sector, Danish Cancer Society) and Switzerland (in the Food sector from the Eidgenössische Technische Hochschule Zürich - ETH - and Swiss Farmers Association Foundations; in the Health sector from e.g. Novartis and Roche Foundations).

1.2. Priority setting

Priorities are usually set at the highest level – government - in all countries, but also at regional level (FR, DE). Agencies and research councils then translate their priorities into detailed programmes, according to their mandate. In some countries there is a strong emphasis on regional priorities (FR, EL, CH). Priorities are identified through a process that involves all relevant stakeholders. Industry, chambers of commerce, research community,

diverse types of governmental structures are consulted in regard to both priority setting and programme design (ministries, agencies) in many ways: special commissions, workshops, panel consultations, peer reviews etc. In Denmark a bottom-up approach was used to develop the recent research strategy. A public consultation on the research needs for the following years was organised by the Danish Agency for Science, Technology and Innovation and a strategic programme – The Research 2020 Catalogue – is currently being developed on the basis of input received through this public consultation. First some of the proposals will be selected by an independent team of experts. These proposals will then analysed again in workshops where representatives from trade, industry, the public sector and civil society will participate. In Sweden, society seems to play an important role in setting research priorities. In France the 'Pôles de Compétitivité' (competitiveness clusters) have members from public and private research and business organisations which are key contributors in the development of new programmes. The national platforms or mirror groups of the European Technology Platform FoodForLife also contribute to the identification of priorities (EL, IE, LV, NO, CH, DK). Ireland is in the process of a National Research Prioritisation Study. The study was launched in response to demand trends, driven by both economic and quality of life considerations, to develop consensus on a number of priority areas and/or approaches to tackling national challenges/opportunities which need to be underpinned by future investment in publicly funded science, technology & innovation. In Sweden as well as in France elements of some programmes are dedicated to bottom-up research activities. In Switzerland elements of the programmes are dedicated to immediate needs, where so called 'associated expert groups' and expert fora play a crucial role (Ressortforschung). In the Netherlands there is a new policy setting approach, 'The Top Sectors'. Within this new approach, the industry is leading in priority setting for research and innovation.

2. COORDINATION AND INTEGRATION OF FOOD AND HEALTH RESEARCH AT NATIONAL LEVEL

Different approaches are used by countries when it comes to supporting food and health research. The group has identified three different categories of research programmes supporting research in food and health.

1) Formalised or ad-hoc coordinated programmes between organisations that fund research that cover identified priorities in the food and health area. If important common activities are identified, coordinated ad-hoc joint calls are made.

2) Programmes dedicated to food and health which are jointly funded by different organisations, either public or private.

3) 'Other' research programmes focused on other or broader strategic issues but which have among their objectives aspects of food and health, for example, programmes on food security, or on lifestyle and health.

In many of the countries consulted, coordination is seen as desirable, however integration is not always a goal in the food and health area. Challenges towards integration include the highly symbolic value of food, which can be different at national or even regional level (FR). On the other hand, the main incentives to integrated and co-ordinated research programmes include: better opportunities for funding, increased efficiency, ensuring multidisciplinarity and possibility to tackle large scale challenges (FR, UK, TR, DE). However, one of the main drivers for integration should be that this is the most effective way to achieve the overall scientific or other objectives (UK). Some examples of areas where integration may be the best way forward are: development of tools (databases) and surveys (FR) or food research 'all along the food chain through the consumer including clinical trials' (CH).

At national level, the very first step towards integration as well as excellent coordination appears to be the establishment of clear structures to facilitate and allow for clear and efficient communication between the relevant players. Regarding integration, there is a requirement for a common strategy followed by the establishment of a dedicated programme with a common funding source, which is eventually managed by a dedicated institution. Commitment at a very high level is also seen as the most important factor in

the development of integrated research programmes, at least at the beginning of the process until it is well established.

2.1. Coordination of strategies

Well established coordination is either ongoing or is being put in place by many countries. A first step towards coordination is the agreement on a strategy/vision or on short or long-term common priorities.

In the UK a cross-government Joint Food Research and Innovation Strategy, supporting a vision for a sustainable, secure food system endorsed at Prime Minister level, was developed in order to improve co-ordination of public research and development on sustainable, secure, safe foods and a healthy diet.

In the UK, coordination is pursued also by funding organisations' groups which operate in specific areas, for example nutrition. Within this type of group, organisations generally share, map and analyse information on their different activities in related areas, and in some cases develop co-ordinated approach to future priorities and joint calls. In 2011, the Technology Strategy Board (TSB) committed up to £6.25m to support business-led projects developing safer and healthier food in partnership with the Medical Research Council, Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council, the Department for Environment, Food and Rural Affairs (Defra) and the Food Standards Agency.

Formalised coordination structures between governmental bodies are established in France - the cross-governmental working groups, in the UK - joint committees between research councils as well as the Chief Scientific Advisors Committee which brings together Chief scientists of each Science-funding Department, in Denmark – Danish Research Coordination Committee and in Slovenia – Council for Foodstuffs – who is responsible both for policy aspects as well as for setting up a Joint Research Strategy to improve coordination of departmental research.

In other cases a flexible approach to coordination is employed: consultation when required between different agencies (SE) or between the national and regional levels - Government, Préfets de Région and Regional Councils (FR). In Spain, national institutions are responsible for coordination, however better coordination is needed between national and regional programmes. In some countries coordination is not very well established but efforts are made to ensure that there is no overlap between research programmes (EL, LV). In Switzerland in 2010, the Swiss Federal Audit Office brought up the issue of 'insufficient coordination within the agricultural and food research sectors. In turn, the Agricultural Research Council is developing at present a research concept not just for Agroscope (Ressortforschung), but for all academic institutions involved in this type of research.

2.2. Food and Health Research 'integrated' Programmes

In some countries, there are programmes which have food and health as their overall goal.

A good example of integration is the Irish cross sectoral Programme for Food and Health research. The 5 key areas of this programme are: National Nutritional Phenotype Database; National food consumption databases for food safety and nutrition; Gut microbiota as an indicator and agent of nutritional health in elderly Irish subjects; Safe and Healthy Foods and the Health Research Board (HRB) Centre for Health and Diet Research (CHDR). This programme co-exists with other programmes in the area of food as well as in the area of health. The highest commitment was required for this endeavour: an Interdepartmental Committee on Science Technology and Innovation under the aegis of the Cabinet Sub Committee on Science Technology and Innovation (STI) was responsible for developing the strategy and the road map for key public good research areas in which cross-sectoral initiatives were required. Financial resources from the Ministries involved were put together for this programme.

In Spain, a specific programme in the food and health field was funded by the Ministry of Science and Innovation. As a result, more scientists began to work in this field.

The Food & Nutrition Delta (FND) innovation programme (2006-2011) in the Netherlands defines six themes related to food and nutrition, one of them being food and health. This programme is divided in to the strategic research part and the valorisation part (knowledge transfer) each of which is supported by the government with around 60 million Euro. The former is implemented through the Top Institute (TI) Food and Nutrition, which is a public/private partnership, its mission being industrial relevance with scientific excellence. Provisions have been already made for this programme to continue. From 2011 onward the Netherlands innovation programme is replaced by the top-sector programme agro-food. This programme is all encompassing for the entire agro-food sector. It includes Research & Innovation, Trade, Investments and development aid. The focus will lie on Food Security, Sustainable Production, Consumer trust and Food & Health. Continuation of FND and TI Food & Nutrition is foreseen in this new approach.

In Germany, the Federal Ministry of Education and Research intends a specific funding pillar for health and nutrition. Within the 'Hightech Strategy' of the Federal German Government food, nutrition and health will become increasingly important – one of the key projects of the future is 'more health through targeted prevention and nutrition'. To foster the implementation of this future goal, the Federal German Government is currently developing an 'action plan' to be launched in 2012 for research into prevention and nutrition that integrates the different scientific disciplines which are relevant in this field.

2.3. Other research programmes addressing food and health

In Norway the main national programme which funds research in the food area is the Food Programme, 'Norwegian Food From Sea and Land', which is funded by several ministries with competences in this field, the main ones being Agriculture and Food, Fisheries and Costal Affairs, and Trade and Industry. This programme is based on the view that food is essential to our health and quality of life and one of its research priorities is 'Food-Related Health Quality and Quality of Life'. Its focus is on innovation throughout the value chain from consumer to primary production for both agricultural food products and seafood.

In the UK the National Prevention Research Initiative (NPRI) made up of government departments, research councils and major medical charities are working together to encourage and support research into chronic disease prevention with a budget of £12 million over five years and the Medical Research Council managing the Initiative on behalf of its 16 Funding Partners.

The UK Global Food Security initiative, which brings together research funding organisations in government and Research Councils, addresses aspects of food and health as part of a wider initiative on food security, principally though a theme on 'sustainable, healthy, safe diets'. In Spain, a specific programme on functional food was funded by the Ministry of Science and Innovation.

In Slovenia, a Cross-government obesity research and surveillance plan was developed. Base on this, a call for a centre of excellence to integrate food, technology, and nutrition expertise was coined.

In Switzerland in Spring 2011, the Federal Council approved a National Research Programme 'Healthy Nutrition and Sustainable Food Production' (13 million CHF over 5 years).

3. MULTIDISCIPLINARITY

Multidisciplinarity is usually embedded from the beginning in the text of calls and relies mostly on communication between disciplines. The majority of the calls for proposals request for different aspects of the research to be addressed. In addition, certain aspects may be promoted to the relevant potential participants (SI). In certain programmes from Germany, multidisciplinarity is an eligibility criterion (for example the disease-related competence networks on obesity or diabetes that integrate national experts from different medical and scientific disciplines). In Sweden the evaluation system is changing to facilitate multidisciplinary projects. In Switzerland, networks between disciplines are encouraged or in some programmes are mandatory (Ressortforschung). In Italy, some research programmes encourage the grouping of projects that cover a whole chain. In France, the ALID programme (Sustainable Food Systems), launched in 2010 by Agence Nationale de la Recherche (ANR) and following ALIA programme, aims to develop a global integrated approach of the food chains based on interdisciplinary projects.

Among incentives for multidisciplinarity are outcomes that fall under the remit of more than one institution. In this case those institutions may decide to work together by coordinating their strategies or programmes or set up joint calls or joint programmes that address the issues (UK, SE). Scientists from distinct disciplines are this way obliged to cooperate to respond to these calls.

With regard to achieving multidisciplinarity, one of the challenges is that high impact journals are highly specialised and discipline oriented and therefore may not accept multidisciplinary research papers (DK). This means that researchers are obliged to focus their work and papers if they want to attain top researcher status.

4. TRANSNATIONAL PROGRAMMES OUTSIDE THE FRAMEWORK OF EU PROGRAMMES OR FUNDS

4.1. Transnational initiatives

In all European countries there seems to be growing realisation that transnational cooperation is needed to solve global problems. However, with the exception of the Scandinavian countries, there are no perennial **transnational programmes.** Scandinavian countries have cooperative research programmes that have been set up by NordForsk, The Nordic Organ for Agriculture (NKJ) and The Nordic Organ for Forestry (SNS). The Nordic Innovation Council, through the Nordic Innovation Centre (NICe), is financing R&D projects aimed at developing the Nordic industry, including the food industry which is one of the most important industries in Nordic countries. The mandate comes from the Nordic Council of Ministers and the Nordic Committee for Co-operation (NOS). An interesting initiative is 'Norianets' – an ERA-net type of project implemented in the Nordic Region.

Transnational calls are mostly implemented on ad-hoc basis, as a consequence of bilateral (or trilateral/multilateral) agreements on governmental level (ministries and/or other funding organisations) in areas where joint priorities and mutual benefits have been identified. The added value can be access to expertise and capacities not available at national level or the acknowledgement that the funding needed is beyond national resources available in the area (UK, FR). An example of such a call is the joint call between France and Germany in the area of food and nutrition (The food and food industries research programme - ALIA - see 8.b for more detailed information). In this case, each country usually funds its own participants i.e. no common pot is established. In Latvia such calls are developed through a bottom-up approach. The type of activities funded through transnational calls include networking (SE) with a view to putting joint proposals together (UK), dissemination or research activities (SE), or support travel and exchange of researchers (ES). In some countries, the Ministry of Foreign Affairs Ministry funds international bilateral calls (FR).

4.2. National calls open to European and international participation

In Ireland, some calls allow for Northern Ireland researchers to access funding if they collaborate with Irish researchers. In the UK, the Food Standards Agency (FSA) calls are open to international participants. In the Netherlands the Food and Nutrition Delta innovation programme was open to international

participation. The Top Institute Food & Nutrition includes a growing number of foreign participants. In Greece the new Cooperation programmes of the National Strategic Reference Frame (ESPA 2007-2013), launched in summer 2009, were open to international collaborations.

An interesting Danish initiative is the establishment of innovation centres outside Denmark i.e. Silicon Valley, Shanghai and Munich. These centres initiate symposiums and meetings for Danish researchers and companies.

5. KNOWLEDGE AND TECHNOLOGY TRANSFER

Technology transfer, innovation and intellectual property rights seem to go hand in hand in most countries. Usually public-private partnerships are built upon the need for technology transfer and innovation. Many of the organisations in the European countries appear to have more than one of these issues within their mandate.

A good example of a programme covering all these aspects is the Food & Nutrition Delta programme in the Netherlands. This is an example of a public-private partnership which is dedicated to innovation in the field and concomitantly deals with knowledge transfer.

While Knowledge- and Technology Transfer is well established in all the countries Knowledge- and Technology Exchange, where relevant information flows in both directions, seems to be a challenge for many, especially in the case of public-private partnerships. In order to increase efficacy and efficiency of the complex multidisciplinary food and health research more 'exchange' instead of 'one way transfer' would be needed.

5.1. Knowledge transfer

Knowledge transfer in the UK as well as in IE has a broader meaning than technology transfer towards businesses, especially in the food and health area. It covers transfer to and use of knowledge by consumers, manufacturers, policy makers and scientists and its impact is therefore much wider, covering besides competitiveness individual, societal and organisational behaviour, health, sustainability as well as policy.

Dissemination of research outcomes through communication in industry oriented journals and the presentation of results at conferences is a feature of most research programmes and used in all countries to encourage **technology transfer**. In Ireland, in addition to the national technology transfer initiative supported by Government, the RELAY project, funded by the Ministry

of Agriculture, Food and the Marine, supports the appropriate management of IP through funding research disseminators to help researchers disseminate the outputs of their research. RELAY also organises industry oriented workshops to provide information on projects funded by the Food and Health Research Initiative.

Some very interesting initiatives are going on in various countries which range from setting goals in scientific programmes, setting criteria in the evaluation of projects, to funding of technology transfer dedicated projects and programmes and building dedicated infrastructures. Transfer of technology and patenting is one of the major goals set for the Greek Operational Programme Competitiveness and Enterprising (EPAN, 2007-2013). Cooperation with industry is set as eligibility criterion in some programmes from Sweden, Denmark, Italy or Slovenia. Joint research projects are dedicated to cooperation of academics and industry or preference is given to projects with at least one industry participant within the programmes of the Federal Ministry of Education and Research in Germany, or in research programmes in Slovenia. The Federal Innovation Promotion Agency (CTI) in Switzerland fosters knowledge and technology transfer between companies and universities by bringing them together as partners on applied research and development projects from all fields. A specific programme (TRACE) is dedicated to transfer of results of research projects to industry (ES).

In Slovenia, a special programme 'Young researchers for Economy' allows PhD students that are employed by a company to carry out basic research, according to companies' needs, mainly in cooperation with institutions of knowledge. An industrial PhD programme is also run in Denmark. In Turkey some programmes give priority to funding PhD theses that have industrial applications.

In Switzerland and Slovenia innovation agencies provide assistance to start-up companies. In Ireland, the Enterprise Agency 'Enterprise Ireland' supports the National Technology Transfer Strengthening Initiative.

In Norway, a specific programme entitled 'FORNY' is dedicated to financing infrastructure for Universities' Technology Transfer Units and supporting projects on proof of concept. Technology transfer Bureaus, Agencies (Cellules Mutualisées de Valorisation; Services des Activités Industrielles et Commerciales) or departments assigned to act as Technology Transfer Offices are established at university level (DE, FR, LV, ES, TR), or even national level (LV). In France, transfer units or subsidiaries are established at research organisations level (INRA- and INSERM- Transfert) and the agro-industrial technical centres 'Instituts techniques' contribute also to technology transfer. In Germany universities and research institutes technology transfer is institutionalised via technology transfer bureaus and agencies. In Denmark technological transfer is done via a system of self owned, non-profit institutes as the Danish Technological Institute or DHI Group. In Turkey

university technology parks offer companies the possibility to use their research premises on a project competitive basis.

5.2. Intellectual property rights

Intellectual property rights are in many cases owned by the producers of such results and are established before the start of projects by an agreement between the involved institutions. In the UK, the Food Standards Agency (FSA) often retains IPR for the research funded. It is generally more common that IPR ownership resides with the organisation employing the researchers than with the individual researchers themselves (LV, DE, EL, CH, IE, NL). For research done in universities and companies, IPR is regulated by law in Germany, Norway and Denmark. Ireland and the Netherlands are currently developing a new IP policy which will facilitate access to IP for publicly funded research. In France the main institution to address IPR is the National Institute for Industrial Property (INPI, Institut National de la Propriété Industrielle; Ministry of Industry). There are also other organisations such as OSEO (National Agency for Innovation (SMEs) or ANRT (National association for research & technology; industries) which address IPR on behalf of their stakeholders. In Germany, some patent service institutions are responsible for the application of IPRs and services around IPRs in the universities. In Switzerland the public sectors' interests must be taken into consideration whenever IPR issues are involved. In Slovenia, more innovative projects or projects which plan for patents are scored higher in evaluations. The Intellectual Property Office takes the lead on IPR issues in the UK: in 2008, it published five Model Research Collaboration Agreements for universities and companies that wish to undertake collaborative research projects with each other and in 2011 a model Industry Collaborative Research Agreement to support clinical research collaborations involving the pharmaceutical and biotechnology industries, academia and NHS organisations across the UK.

6. INNOVATION

In order to encourage innovation, the appropriate environment for successful partnerships is required, as well as the provision of excellent infrastructures.

An example of a joint business-led innovation programme focused more on the agri-food area is the UK's Innovation Platform for Sustainable Agriculture and Food funded by the Technology Strategy Board (TSB), the Department for Environment, Food and Rural Affairs (Defra) and the Medical Research Council, Biotechnology and Biological Sciences Research Council (BBSRC), (building on a previous programme of five Farming and Food Science LINK programmes funded by Defra with other partners). In Ireland the Alimentary Pharmabiotic Centre was set up as collaboration between Irish researchers and the Pharmaceutical industry. In France, one of the three priorities of the

newly launched National Research and Innovation Strategic Plan is 'health, well-being and food'. In the set-up of this programme, the 'Pôles de Compétitivité', which are industry lead Public-Private Partnership clusters involving research and industries, and funded by the 'FUI' programme (Fonds Unique Interministériel, were playing an important. The same 'Pôles de Compétitivité' have a role in joint funding initiatives as well as in promoting **knowledge intensive research**.

Ways to support innovation in general are by setting goals in research programmes (EL, TR, IT) or funding applied research (DE, LV, CH, IE) or funding research jointly with industry (NO, IE). Spain has recently set innovation among the objectives of its scientific programmes. Some countries are setting up programmes intended to specifically support innovation (LV, DK, FR, IT, NL, NO), such as the French 'Aide au partenariat technologique' (financed by OSEO – The National Agency for Innovation in SMEs) or the Italian Network for Innovation and Technology Transfer to Enterprises (RIDITT) which is an initiative sponsored by the Ministry of Economic Development aimed at promoting innovation in SMEs. In Sweden The Swedish Governmental Agency for Innovation Systems (Vinnova) Swedish cross-disciplinary food research programme 'TvarLivs' that is a jointly financed research programme between the several state organisations and the business world and where the latter contributes with 50%.

In Switzerland, Swiss Food Research, supported by CTI, is an association which brings together the relevant academic institutions, with all their competences and infrastructures, with the Federation of the Swiss Food Industries. Through this association SMEs who are not able to afford expensive equipment, have access to the research infrastructure. In Denmark, universities support innovation directly; an example is the Danish Technical University's (DTU). Many of DTU's facilities are available to the business community, either in the frame of joint projects or for rent. There is also the Scion-DTU science park where companies can rent offices and gain access to facilities and competences. DTU Symbion Innovation, which is DTU's own innovation company, assists potential entrepreneurs in finding out whether there is a sustainable basis for attempting to establish a new high-tech business or raising venture capital.

The UK government's approach to innovation is set out in the Blueprint for Technology (UK, Department for Business, Innovations and Skills, 2010), and Concept to Commercialisation (TSB, 2011).

Obstacles to innovation include inadequate coordination among research funding bodies and fragmentation of funding. The support for individual enterprises instead of a holistic approach and strengthening of all social partners is also considered to be an obstacle (EL).

7. PUBLIC-PRIVATE PARTNERSHIP

An example of **public-private partnership** in the nutrition area is the Diet and Health Research Industry Club (DRINC) from the UK, which is a Research Council-private partnership. DRINC will spend £10M over 5 years (2007-2012) to help the food industry develop products that deliver enhanced health benefits for consumers, by improving understanding of healthier diets and studying bioactives in foods. The Biosciences Knowledge Transfer Network (KTN) is a UK body funded by the TSB to increase the conversion of the UK's bioscience expertise into innovative agricultural, food and industrial bioscience products and processes through knowledge exchange. It has 2,500 global members that can interact through an Open Innovation portal called 'Connect'. A Knowledge Transfer Network (KTN) dedicated to Food Processing and another to Health Technologies exist in the UK. A KTN is a group of individuals with common interest in a new technology and are funded jointly by government, industry and academia. The Top Institute Food and Nutrition is a PPP in the Netherlands between the Dutch government, research institutes and large industrial partners from the Netherlands, France, US, Denmark and Switzerland.

In some countries public-private partnerships are supported by dedicated bodies or programmes but are not specific to the food and health field. The support consists of consultancy type activities or dedicated funding for joint public-private projects. In Spain, there are many tax benefits for those companies investing in research and collaborating with public research institutions to run research and development programmes. There is also a specific programme CENIT, aiming to enhance public-private partnerships. The Latvian Agency for Investment and Development is providing support to public and private partnerships: providing information and consultative assistance, assessing potential resources and financing solutions, giving recommendations and helping in the elaboration of proposals and decision making, developing the legal basis for such partnerships. In Ireland, the Enterprise Agency (Enterprise Ireland - EI) funds the Innovation Partnership Programme which promotes the development of collaborative research between industry and the research community. In addition, EI funds a public-private partnership entitled Food for Health Ireland which involves four research organisations and four of the large Irish Dairy Companies. In Norway companies contribute by their own initiative to funding of 'Competence building projects', which are research projects at the universities or research institutions.

Lack of communication and links between public institutions and companies are seen as obstacles in promoting knowledge intensive research (EL).

At EU level the landscape is still scattered but there are attempts to overcome fragmentation, for example the Knowledge and Innovation Community

(KIC) Food4Future (sustainable food supply chain, from farm to fork). It will consist of 4-6 leading regions/countries and the main players are companies, entrepreneurs, investors and universities. It is expected to have a total budget of 100-150 million Euros per year with 25% of the cost covered by the European Institute of Innovation and Technology (EIT). This KIC, although initiated at EU level was the result of several countries' efforts to encourage public-private partnership, ensure technology transfer and boost innovation, while including education and therefore addressing the whole knowledge triangle.

8. GOOD PRACTICES IN FOOD AND HEALTH RESEARCH PROGRAMMES

The expert group has selected a few of the larger European food and health initiatives for a more detailed consideration of the procedures used for the adoption and implementation of the programmes as well as the impact of the research. Coordination and integration of the programmes were included into the evaluation, which was aiming to identify common characteristics for successful programmes in order to describe in general terms some of the more important elements of good practices in food and health research programmes.

8.1. Case studies

8.1.1. Irish Food and Health Initiative

The Irish Department of Agriculture, Food and The Marine (DAFM) and the Health Research Board (HRB), in collaboration with the Department of Health and Children, supports five research programmes under the Food for Health Research Initiative (FHRI). In recognition of the fact that consumer health and food safety are identified as being of paramount importance, in particular human nutrition and food science, assessment of possible risks from food constituents or contaminants, and identification of potential food components that will impact positively on health, this joint national programme in food and health was developed. Underpinning the development of such a programme was and still is a clear commitment in Ireland to supporting research in Food and Health, as expressed in the National Development Plan 2007-2013, the AgriVision 2015 Action Plan, and the Government's Strategy for Science, Technology and Innovation 2006-2013.

The Food Institutional Research Measure (FIRM) funded by DAFM has invested €140m over the last decade for food research, a significant portion of which had a health dimension orientated towards industry and the consumer. The Health Research Board has prioritised and funded Health and

Diet Research to underpin improvement of health policy and health practice for the Irish population, a commitment reflected in their latest Strategy for Health 2010-2014.

The FHRI is a significant initiative valued at approx. €25 million and supports a comprehensive research programme on: development of nationally representative food consumption databases; monitoring and surveillance of food safety, in particular chemical and microbial contaminants; development of a national nutrition phenotype database; a study on the relationship between diet, gut bacteria and health status in the elderly; and the provision of an evidence base for public policy, health promotion and clinical practice on the prevention and management of obesity, diabetes and related metabolic disorders. As indicated above, the FHRI Programme builds on strategic state investment in research capacity over the past 15 years, maintaining Ireland's reputation as leaders in food and health research.

The following is an account of the process by which the FHRI was developed. The Irish Government under the auspices of the Strategy for Science Technology and Innovation set aside funding for the development cross-thematic research programmes. Government Departments were requested to put forward proposals to the Interdepartmental Committee (IDC) on Science, Technology & Innovation in linked areas of research. Due to the significant funding that had been invested in the areas of food by DAFM and in health by the HRB over previous years as well as the rising levels of obesity and diet-related diseases in the Irish population, both DAFM and HRB agreed, for the first time to develop a joint research programme in Food and Health. A submission was made to the IDC and a decision taken at Government level to support the development of the proposed joint programme. Following this decision, both funding agencies developed the FHRI programme and a call for proposals was launched in 2007. In addition to launching the call for proposals, the agencies signed a Memorandum of Understanding (MOU) which outlined the main objectives of the joint program including the areas of shared concern, the programme would be results driven, add value to existing initiatives and compliment existing funding by both agencies. The MOU specified the programmes which would be supported, the funding to be provided from each of the agencies and the evaluation and management procedures for the FHRI. DAFM took responsibility for the management of 4 of the 5 programmes including nutritional phenotype database, safe & health foods, food consumption databases and the gut health in the elderly programmes. HRB took responsibility for the Diet and Health Research Centre. Both agencies were involved in the evaluation of all programmes. Once the independent panel of experts approved the successful proposals, awards were issued and the programmes initiated. In order to deliver of the overall objectives as set out in the MOU, a National Steering Group was put in place which comprised of the 5 Principal Investigators of the programmes and representatives of the agencies. This group was required to deliver a joint annual report on the main research outputs of the programmes, collaborations outside of

the 5 individual programmes, joint training and outreach activities, dissemination of outputs and resources leveraged from other funding sources such as FP7. The overall expected impacts of the 5 programmes are as follows:

1) Capacity – infrastructure, critical mass in human and physical resources

2) Integration & leveraging – from national and international funding programmes

3) New scientific knowledge - role of diet in obesity, cardiovascular, skeletal health & cognitive function; role of gut flora in intestinal health & healthy ageing; consumer protection against food contaminants

4) Human capital development – highly skilled researchers and specialised training programmes

5) Benefits to stakeholders including industry, public health professionals, regulatory authorities, consumers and academia.

Outputs to date are numerous in terms of the overall impacts listed above. There has been extensive collaboration between the programmes and other research groups both nationally and internationally as well as regulatory authorities, clinical practitioners, clinical research facilities, the Irish Health Service and many more. The achievements to date are listed below:

- Human capital
- 30 MSc and PhD students; postdoctoral researchers;
- technicians; clinicians; nurses; contract researchers
- Leveraging funds
- Successful submissions to National funding programmes & EU FP7
- Discussions with National Institute of Health (NIH)
- Multisite Ethical approval
- Development of common SOP's for sampling & storage of biological samples across all 5 programmes
- Joint recruitment of study cohorts
- Sampling programmes developed & initiated
- Scientific publications – 22 to date and many more in preparation

As these programmes continue to develop, it is clear that there will be many more impacts beyond those originally envisaged such as integration of the data from the individual programmes to underpin the development of a national nutrition policy based on the most up-to-date and scientifically robust data as well as provide important information to the food industry in developing healthier food products. These programmes in addition to other Irish programmes in food and health ensure that Ireland can make a strong contribution to the JPI 'A Healthy Diet for a Healthy Life'.

8.1.2. French-German ALIA programme

The food and food industries research programme (ALIA) (2008-2010) was oriented towards a better knowledge and the development of tools for more sustainable food systems and affordable products to improve the well-being and healthy ageing of the consumers. The programme finances research under three axes:

1) Well-being and healthy ageing of populations - with the main objective of succeeding to improve the quality of life of specific or/and frail populations thanks to a diet adapted to their needs.

2) A more dynamic food production economy - with the main objective of improving competitiveness of enterprises and improving food and their technological pathways.

3) A balanced society and a more sustainable development of food production - with the main objective of developing and applying tools for sustainable food systems (economy, environment, society).

The programme requires multidisciplinarity and industry participation (for the ANR side)

The Agence Nationale de la Recherche (ANR) and the Deutsche Forschungsgemeinschaft (DFG) have set up an agreement to finance research projects within the scope of the first axis of the ALIA programme. The aim is to strengthen the position of research teams from both countries at the international level and reinforce scientific cooperation between France and Germany in the field of human nutrition. This collaboration is now in its third year.

Proposals had to be balanced between French and German participation, had to include at least one French and one German participant, be written in English and the same proposal had to be submitted both to ANR and to DFG. The proposals submitted to ANR and DFG were selected by their national committees, the evaluation committee and steering committee for ANR and the Fachkollegium for DFG. For ANR, projects were assessed as all projects of the ALIA call and using the same criteria. The German partners had to respect the criteria asked for the **Normalverfahren** of the DFG. Additional criteria were used to evaluate the added-value of the international cooperation and the balance of the partnership. Consortium agreements were mandatory.

ANR and DFG kept each other informed of their decisions and took the final funding decisions together. ANR and DFG support the expenses related to entities established in their own countries in accordance with their own financial rules.

In case of positive evaluation by only one of the agencies, this agency will have the possibility to support the scientific activities of the national partner (s), provided that these activities can be conducted independently of the other partner (s) and that, for ANR, the acceptability and eligibility rules are respected.

Seven FR-DE proposals were financed in 2008-2009. For comparison, axis 1 founded 12 projects for a total of 4.5 million Euro for the same time frame.

8.1.3. Dutch Top Sector Approach Agro-Food

The Top Sector approach is a new form of public private partnership, designed to enhance the competitiveness of Netherlands. Industry, academia and government will make a joint plan concerning joint investments in knowledge, foreign policy, education and sustainability. These plans will be formalised through an innovation contract between the partners.

Competitiveness of the industry is leading in this approach, therefore the industry has the lead in making the plans for the top-sectors. Ten different Top sectors have been identified, based on the industrial strengths of the Netherlands; Agro-Food is one of these top-sectors. The Topsector Agro-Food will focus on an internationally leading, sustainable sector that society can be proud of. The sector is growing through innovation, knowledge and entrepreneurship. Increasing international competition requires continuous investment in knowledge and innovation at a time when the government has limited investment opportunities.

Added value will be created by responding to the increasing demand for health, sustainability, taste and convenience, whereby affordability is an important precondition.

These areas often require complex solutions that companies cannot achieve on their own. The sector will therefore invest in business-transcending innovation themes that address the most important consumer trends. An example in the area of health is the development of consumer-driven products for specific target groups such as senior citizens, children and athletes.

The international innovation strategy is aimed at making the Netherlands the leading food innovation hub in Europe. This can be achieved, for example, by taking a leading role in the European Technology Platform (ETP) Food for Life and focusing on the Horizon 2020 Programme of the EU Framework Programme 8, and furthermore by promoting cooperation among Member States through the Joint Programming Initiatives 'A healthy diet for a healthy life' and 'Food Security, Agriculture and Climate Change', 'Eureka' and the Knowledge and Innovation Communities (KICs).

The Dutch food industry has, in cooperation with the government, set up a unique knowledge infrastructure consisting of public-private partnerships (PPPs). The main player is the current **Top Institute Food and Nutrition** (TIFN), a leading international PPP in which several organisations (WUR, University of Maastricht, University of Groningen, TNO and NIZO) are working closely with leading companies, including a number of large multinationals. The Dutch government supports TI Food and Nutrition with 61 million euro for the duration of the programme. For 2010-2014 the programme has a budget of 114 million Euro, with 39.9 million Euro government support. The rest of the budget is gathered from participation fees of the private partners, most of the fees coming from big industries and industrial associations.

The **Food & Nutrition Delta Programme** (FND) has also been set up for commercialisation of agri-food knowledge. Through FND networks and platforms will be created in an integrated manner to develop new science & technologies in order to enhance the food business activity and new business development along the food industry, with special attention to SMEs. This will lead to the development of innovative, new or enhanced food products that fulfil consumer needs and expectations. Those products, combined with recommended changes in lifestyle and eating patterns, will have a positive impact on public health and the quality of life. Moreover, the competitive edge and market position of the food industry will be enhanced.

8.1.4. Danish programme commission for Strategic Research in Health, Food and Welfare

The Danish programme commission for Strategic Research in Health, Food and Welfare was founded in 2004 and has distributed funding for approximately 70 million €/year. The themes for 2009 was 'Connection between food, health and lifestyle', 'Foods including biological manufacturing', 'Bioresources, food and other biological products' and 'Individualised health initiative'. The themes might vary from year to year but always under the heading health, food and welfare. The themes originate from a bottom up procedure ad Research 2015.

The programme is open for proposals once a year, the procedure for application is in two phases and the procedure is as lean as possible in order to facilitate the applicants. International collaboration is promoted, is included as a key criterion in the assessment and it is possible to apply for funding for international partners. It is also possible to apply for projects between two or more themes and it is important to have interdisciplinary between different fields of research including humanities and social science. A criterion for funding is a competent plan for dissemination of the results and emphasis is put on both managerial and scientific competencies for the head of research and other key team members.

Furthermore the assessment criteria include interaction between public and private sectors with synergies between the parties, including in particular co-financing from the private sectors depending on the instrument applied for. There a three different instruments: research projects (minimum 1.3 million €), research alliances (1.3 to 2.6 million€) and research centres (up to 4.5 million €). Especially for centres a substantial co-financing for the private sector is needed.

The program commission receives around 110 proposals every year and has been very successful in establishing centres as DanOrc –the Danish Obesity Centre and to support important project looking into the importance of maternal and foetal care for prevention of adult disease and the connection between lifestyle and diabetes 2. Another important area is better utilization of plants both looking into the bioactivity of the components, plant products for different consumer segments and utilization of all plant fractions in a biorefinery concept. More can be seen at http://en.fi.dk/councils-commissions/the-danish-council-for-strategic-research. A list of funded projects 2009 can be seen at http://www.fi.dk/stoette/bevillingsoversigter/2009/347-mio-til-strategisk-forskning-i-sundhed-foedevarer-og-velfaerd/ and for 2008 at http://www.fi.dk/stoette/bevillingsoversigter/2008/programkomiteen-for-sundhed-foedevarer-og-velfaerd-bevillinger-2008/

The success of the programme is very much due to the strategy of the program commission where the proposal is selected on the basis of three equivalent criteria: the relevance, potential impact and quality of the research but also of the duration of the programme for more than 6 years.

8.1.5. Spanish programme INGENIO

Programme INGENIO 2010 was launched by the Spanish Ministry of Science and Innovation (MICINN) with the aim of reaching the 2% of the GDP devoted to research in Spain in 2010. Among the Instruments of the programme, three of them have developed projects that are related to the topic of Food and Health.

1) **CONSOLIDER Programme** aims to consolidate large research groups with a high level of scientific performance, and established collaborations with industry.

A project within this programme that is within the Food and Health topic is the Fun-C-Food project (New ingredients for functional foods to improve health). This is a five-year project that involves 17 research groups from different institutions and universities in Spain (some 200 scientists), and an industrial platform with 22 food industries. In the first two years of the project it has produced more than 400 publications in scientific journals and 21 patents have been registered (some of them already licensed). A good

number of research contracts with Industry were carried out (96 research contracts) for a total amount of 3.78 Million € for these first two years.

2) **CENIT Programme** aims to implement research and innovation in the Industries. The leaders of these projects are the Industries and they co-fund the project 50/50%. They normally subcontract research groups from Universities or Research Institutes to help in the development of the project. Two examples of this CENIT programme projects should be mentioned within the food and health area:

   1. The project **SENIFOOD** - Industrial research on specific diets and food for the elderly - that involves 14 companies, and different research institutes and Universities.

   2. The project **PRONAOS** - Scientific research for the development of a new generation of food to control weight and prevent obesity - involves 15 food industries that subcontract different research groups to complement the research carried out in the R+D departments of the Industries.

3) **CIBER Programme -** Virtual Biomedical Research Centres. These Virtual Centres coordinate Biomedical Research in different institutions (hospitals, universities, research institutes). One of them is directly linked to the Food and Health programme:

   CIBERobn - Virtual Center for Biomedical Research on Obesity Physiopathology and Nutrition - involves 28 different groups around Spain, and covers topics related to Obesity and cardiovascular health, nutrition and cancer.

8.2. Principles and Mechanisms of Good Practice in food and health research programmes

A number of principles and practices have been employed in the development of food and health research programmes. A 'top-down' agreement on the overall challenge to be addressed, and a commitment to develop a co-ordinated approach to this, is an important first step to generate the impetus needed to bring actors together and develop the details of the work and how it will be delivered.

In general, agreement on a set of underlying principles can help facilitate future cross-funding agency working. This can be supplemented by individual agreements between participating organisations setting the terms of specific collaborations.

Possible principles include:

- **Early engagement with potential collaborative partners on new ideas.** Funding organisations should commit to actively seek out funding partners, where appropriate, and to share research priorities at the earliest stages – the more developed an idea is, the less likely a funding organisation will be willing to adapt it to meet a joint need even where there is added value in a joint approach. If joint funding is not feasible or sufficiently advantageous, other avenues of joint/collaborative working should still be explored.
- **Overall focus on outcomes and impacts, rather than on inputs.** Proposed work should define objectives in tackling the identified problem and, where possible, refer to shared targets. For programmes with several elements, there should be clear coherence between individual parts in tackling the overall needs, and clear plans for translating outcomes to serve key stakeholders.
- **High level buy-in from all relevant funding organisations.** Different funding organisations' mechanisms and reasons for undertaking research can be barriers to working together. If funding organisations agree on the desired outcome, concerns over the mechanisms of achieving that should be of lesser importance, provided they commit to collaborate in a pragmatic fashion to deliver the work. There should be a 'can-do' approach rather than a 'we don't do things that way' approach. In other words, the overall objective drives the instrument, not the other way around.
- **No 'one-size fits all' funding mechanism.** A range of funding models and modes of collaborative working could be considered depending on the circumstances and funding organisations involved – it will be for each group of funding organisations to decide the best way to come together in relation to a proposed piece of work. With experience of working together, a small number of overall mechanisms may develop. The ERA-learn initiative which was developed at EU level could serve as an example.
- **Cover all relevant perspectives in developing research questions/ approaches.** Ensure natural, physical and social sciences perspectives are addressed where relevant and appropriate. Ensuring that programmes take due consideration of policy drivers, potential economic impact and the wider stakeholder benefits of the programme.

Possible mechanisms include:

- **Meetings between funding organisations to discuss possible collaboration and to identify structural/administrative barriers to collaboration at an early stage.** This helps to identify whether there are any real 'deal breakers' which are then be the basis for developing ways to work around the problems. For example, the JPI 'A healthy Diet for a Healthy Life' will provide a platform for such discussions.

- **Involvement of other funding organisations in reviews of programmes.** When undertaking internal reviews of funded work, ensure all other relevant funding organisations are made aware/involved to take account of the wider landscape, especially when performing gap analyses. This may also help identify advantageous opportunities for closer future working.
- **Set up a network of food research focal points within each funding organisation**. As part of the function of an identified post, so there is continuity, to facilitate early engagement on ideas for cross cutting research and to act as brokers in setting up cross funding organisations teams to take the work forward.
- **Resources for networking.** It is important to consider funding and other support to facilitate networking and build up relationships and structures, as well as funding for the research activities themselves.

9. CHALLENGES AND OPPORTUNITIES

Throughout the discussions of the Expert group, a number of challenges as well as opportunities with respect to the development of integrated research programmes in food and health were identified. The challenges are based mainly around key issues such as the lack of a strategic approach, different approaches to the development of research programmes within European countries, capacity of the research system with respect to skills and infrastructure, support for networking and the ability of European countries to support cross-border initiatives. The opportunities are related to these challenges and are proposed as a possible 'way forward' for the Commission in developing an approach to the food and health research area.

9.1. Challenges - Segregation food/health research area

Strategic approach

Historically, the food and the health research areas have been dealt with separately with respect to policy, research and education/training. As a result, there are **different institutional structures**, programmes and mechanisms for defining priorities. In some cases, research is carried out independently in both areas by **different programmes with specific goals**, so **financial and human resources can be fragmented**.

At the political level, whether it is at the international/EU/governmental level, there is a strong need for prioritisation in this area in order to allocate resources more appropriately. At any of these levels the strategic importance of the food (diet) and health area is not fully recognised, for example when compared to health standing alone. This may be due to the fact that

there is a **lack of an agreed overall vision** and aim for the area that reflects all potential partners' goals and needs. This in turn may stem from the competition for resources between the food and the health area. These contradictions and competitions lead to less funding being made available.

An additional point is that the emerging views on 'grand challenges' may see food and health as part of a wider issue, not a 'challenge' in its own right. For example, two challenges that are attracting concern and priority at national and EU level are Food Security and Health/wellbeing/lifestyle. Food and health will be a part of both of these, but are not the 'headline' or defining aspects of either. This is not necessarily a problem; but it does means that those working in this area need to understand how diet and health relate to and can contribute to these wider priorities and challenges.

Trust

In some instances a lack of trust between different stakeholders – for example industry – research community – consumers is a challenge for further integration of research programmes.

Different approaches across research programmes

At the level of the funding bodies, probably the most difficult area is the **alignment of the content of different programmes**, which are a result of strategic choices made by different policy and funding bodies. Additionally, the **scheduling of the different steps** (generating ideas; setting priorities, issuing calls, forward commitment of funding) and the management of these programmes (arrangements for peer review, contracts, payments etc.) can make it difficult for funding organisations to define a common agenda. The administrative rules and procedures and instruments to be used are usually different, quite detailed and cumbersome and aligning them is not possible once they are set. IPR rules may be also different which makes the agreement between different entities and researchers more difficult.

Dedicated budgets are usually set for multi-annual programmes making it hard to respond quickly and to find money for new ideas and collaborations.

Capacities
- Skills, Training and education

Researchers in the food and in the health field lack a common understanding of challenges. This is undoubtedly part of the scientific education/training of researchers as well as the separation in research structures and programmes which maintains this separation.

In cross disciplinary projects publishing in recognised journals might be harder than in single-discipline projects. As multidisciplinary research by

definition uses many disciplines the reviewers for a specific journal find it difficult to give the criteria for what defines 'good' research and 'good' scientific method in this regard and publishing can therefore be harder to achieve. In addition, many researchers suggest that there is a shortage of high impact multidisciplinary and interdisciplinary journals. However, a Danish analysis[4] shows that multidisciplinarity is particularly associated with positive effects when the interdisciplinary research area is relatively mature as it might be for food and health research at least in some countries. In areas where this is not (yet) the case, researchers often face significant **challenges in scientific assessment and dissemination of their interdisciplinary research**.

Infrastructures

Many European countries have made significant investments in the recent years in development of national food and health research infrastructures. However, in order for these investments to achieve significant impact in resolving societal challenges, these infrastructures need to be coordinated and in some cases better integrated across the European countries. In addition, these infrastructures need to be maintained and accessible to others for exploitation. There is also a shortage of research infrastructures in Europe in the food and health area, particularly in relation to access to large population groups.

Networking/support

Funding and other support – for example in peoples' time - to facilitate networking and build up relationships and structures, is as important as funding for the research activities themselves. This support can be particularly helpful at the start of initiatives. Conversely, lack of this support can be a real barrier to progress. Even though the cost of this support is likely to be small relative to the costs of supporting research, these administrative resources can be more difficult to secure, either because they are managed though a different route to direct research funding, or because they are under more pressure in times of economic restrictions.

Cross-border funding

Apart from some of the points mentioned above which also apply here, there are some specific issues that impede the development of transnational research programmes.

Legal requirements and other rules constrain many funding bodies to fund only organisations in their own country. Despite these issues there have been some good examples of transnational cooperation (see point 8.1.2). It

4 Tværfaglighed i Strategisk Forskning 24.11.2009 ISBN 978-879-23-7221-5; http://www.fi.dk/publikationer/2009/tvaerfaglighed-i-strategisk-forskning/?searchterm=tv%C3%A6rfaglig%20strategisk%20forskning

should be noted that there are many other activities besides shared funding that help to improve co-ordination in research programmes. There are several aspects of mobility of researchers which do not allow a full development of their research capacities. One of the most difficult aspects is access to infrastructures from a different country.

9.2. Opportunities

Definition of a common strategy

The European Commission should support the establishment of a common vision in the area of food and health at EU and international level. This process should consider the achievements of the recent Joint Programming Initiative 'A healthy diet for a healthy life' (JPI - HDHL) and assess if there are unmet needs or further actions required. One action that could be envisaged would be support for the identification of common challenges in the field, not only by foresight activities.

Enhanced stakeholder communication

Funding organisations should find the most suitable way to allow a continuous exchange of views between the stakeholders from both the food and the health field. To achieve a truly common vision, all stakeholders should be consulted so that their concerns and priorities are taken into account.

As many initiatives have arisen lately in this area, communication between those as well as expert groups should be supported by the Commission.

To enhance collaboration and trust industry, research community and consumers should strive to set common goals.

Research programmes based on a common strategy

An impact assessment of what research in the food and health field has achieved so far and what it would be able to achieve should be considered. This would support the inclusion of this field among the strategic priorities.

The Commission should support food and health research as a priority field within the agreement of the grand challenges. In order to raise awareness to challenges and opportunities of food and health research, this should be also put on the agenda of various expert and commitology groups in the research field.

FP6 and FP7 EU programmes have funded many multidisciplinary projects in the food and in the health area. Dissemination and communication should be given the necessary attention so that accomplishments of such project are visible while emphasising the role that multidisciplinarity has played

in achieving them. This would support the inclusion of this area in future research programmes.

Interdisciplinary training and education

There should be EU support for setting up interdisciplinary research education programmes in the area. This type of programmes could also envisage support to universities and institutions to encourage researchers to seek funds for cross disciplinary research and reward both professors and upcoming researchers for their work in such domain.

Fit for purpose infrastructures

Further progress needs to be achieved in the infrastructures field. The existing infrastructures have to be maintained and made available to the relevant end-user and there has to be support for identifying new critical infrastructures. Many infrastructures have been set up by EU funded projects, however there has been limited success in identifying a mechanism to maintain them and/or make them accessible to other researchers once projects have finished. The effort to identify infrastructures in the food and health area has to be continued, taking into account also developments in the JPI HDHL.

Networking support

There should be funding and other support to facilitate networking and build up relationships and structures. This can make a real difference to the success to initiatives, particularly in the early stages. This could build on experience at national and at EU level, for example the support through EUREKA (Pan-European Network for Market-Oriented, Industrial Research and Development), COST (European Cooperation in Science and Technology), collaborative working groups, ERA-NETs (European Research Area-NET) and CSAs (Collaboration and Support Actions) in support of the development and implementation of JPIs. Support for networking could be based on the principle that networking should lead to progress in implementation of coordinated activities, rather than being an end in itself.

Develop the basis for trans-national research

The Commission has identified itself challenges in this field and has been proposing actions in the new Commission Communication COM(2010)546 *Europe 2020 Flagship Initiative - Innovation Union* as well as in COM(2007)161 *Green paper The European Research Area: New Perspectives*.

10. FINAL CONCLUSIONS

Within the Food and Health area coordination is usually pursued, integration is rather an exception. While some coordination mechanisms seem to work very well, integration may be harder to achieve but would provide the advantage of common strategies and common funding for jointly agreed priorities. Commitment at the highest level seems necessary for each of the two alternatives. There are several principles that are fundamental to a coordinated or integrated programme in the food and health field:

- Highest level agreement on the overall challenge to be addressed, a commitment to address this in a coordinated or integrated way as well as providing the necessary resources;
- Establishment of clear structures to facilitate communication between institutions and stakeholders involved in the food and in the health field;
- A common research strategy or vision and agreed common short and/or long term priorities, focusing on outcomes and impacts and talking into account different perspectives;
- Implementation of the strategy through coordinated or integrated research programmes based on flexible funding mechanisms;
- Enabling the capacities which are needed to support such types of research: researchers' skills, infrastructures and networking capabilities.

One way to foster knowledge and technology transfer and innovation in the food and health area is the Food4Future (Sustainable food supply chain, from farm to fork) Knowledge and Innovation Community, which could be considered a good start from this point of view. This way a strong link between actors in the research, innovation and education field could be established.

Some advantages of having well-coordinated or integrated programmes have been indentified by the group: better funding opportunities, increased research efficiency, ensuring multidisciplinarity and the possibility to tackle large scale challenges.

In all European countries there seems to be growing understanding that stronger transnational cooperation is needed to solve global problems. Expertise and capacities may not always be available at national level and funding needed may be beyond national resources available. If it is decided to set up transnational programmes similar principles as the ones stated above should be applied.

Added value of a Common Food and Health Research Strategy at European level will need to be demonstrated by the results to be achieved in the future, and specific areas where such a strategy will have the best impact are still under consideration.

The R&D landscape is still scattered, however there are attempts by different actors to overcome fragmentation and to develop joint activities (Technology Platform, Joint Calls (ALIA), newly established Collaborative Working Group and SCAR, Expert Group on Food & Health, previous and upcoming ERA-Nets etc.). A mechanism for communication between these activities must be established.

Finally, the JPI 'A Healthy diet for a healthy life' which is broad based and member state driven initiative, delivers for the first time a platform, which is sufficiently mandated by all its participating countries, to address this major issue. It is imperative to allow all Member States, stakeholders and European entities to easily contribute to the initiatives and activities under the JPI.

ANNEX – INDIVIDUAL CONTRIBUTIONS

Information from each country was provided based on a questionnaire developed by the Commission and agreed by the experts. Their individual or joint contributions cover the period March-May 2009. In some cases, updates were provided during the following period. When considering those contributions it should be kept in mind that the group's aim was not an exhaustive mapping of programmes and issues in the food and health area and that since the information was collated the situation within some of the countries may have changed.

Contribution of Ms Jette Nielsen and Mr Arne Büchert from Denmark

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

The most important Danish institution for public funding of research including research in the Food and Health area is the Danish Agency for Science, Technology and Innovation, which is an institution under the Danish Ministry of Science, Technology and Innovation. The Danish Agency for Science, Technology and Innovation serves and oversees a wide range of independent councils, commissions and committees which support and advise on research and innovation. This includes the assignment to function as secretariat to the Danish Research Coordination Committee, the Danish Council for Independent Research, the Danish Council for Strategic Research, the Danish Council for Technology and Innovation, the Danish Research Policy Council and the Danish Committees on Scientific Dishonesty. The research programmes are worked out and managed by the individual Research Councils in cooperation with the Danish Agency for Science, Technology and Innovation is to promote research of high international standard. The Agency's activities are therefore geared towards establishing the best possible environment for research.

Here is a list of the different councils under the ***Danish Agency for Science, Technology and Innovation:***

Danish Strategic Research Council
Programme Commission on Health, Food and Welfare (40 million euro in 2010)
Programme Commission on Individuals, Health and Society (14 mill)

Danish Councils for Independent Research
- Danish Research Council for Technology and Production Sciences (37 mill): Biotechnology; building and construction technology; electronics; energy technology; environmental technology; IT and communications technology; chemical technology; mechanical engineering and production technology; micro and nanotechnology; materials technology; medical technology; plant and animal production; veterinary science; foods; exploitation of natural resources and environmental protection.
- Danish Medical Research Council (31 mill):
  All aspects of basic, clinical and socio-medical research geared towards human health and disease

International collaboration - 13 million Euro in 2010
- Strategic funding given as part of the basic funding to the universities that shows ability to get EU funding.

Danish Council for Technology and Innovation (108 million euro in 2009 – also other subjects than food – health – well-being)
- Cooperation and interaction: Innovation Consortia. Approved Technological Service. Industrial PhD. Knowledge Pilot. Networks of High Technology.
- Entrepreneurship and commercialization: Technology Transfer and Business Incubators.
- Initiatives at a regional level: Innovation environments, Regional growth environments and Regional initiatives.

Danish National Research Foundation
- 52 million euro/year to centres of excellence at the moment: Technical Sciences (5 centres), Social Sciences (5 centres), Humanities (9 centres), Bio Sciences (23 centres) and Natural Sciences (26 centres)

In March 2010 a new pilot program in collaboration between ***Danish Council for Technology and Innovation*** and the Danish Strategic Research Council is released called SPIR (Strategic Platform for Innovation and Research). The proposal can be up to 13,5 million euro and must be a collaboration between several universities, institutes and industries. There are two main areas energy and food.

Most of the public funding of the national research is - as seen above - to day organised via the Danish Agency for Science, Technology and Innovation and the Research Councils. However, a few of the other ministries are able to finance or co finance research activities of specific programmes of relevance for the food and health area. This includes:

Ministry of Food, Agriculture and Fisheries

- Innovation – 18 million euro in 2009 mostly given to SME.
- Food Research – 18 million euro in 2009

Focus in 2008: Quality food with focus on taste and creativity, Animal welfare, Sustainable food and non-food. Focus in 2009: Crops for the future with focus on bio and gen technology and Food safety.

From 2010 the funds for research will be managed by of the Danish Agency for Science, Technology and Innovation whereas funding for development and demonstration projects will remain under the Ministry of Food, Agriculture and Fisheries. The new program is called Green Development and Demonstration Program (GUDP). The upstart is planned to be medium 2010 and the focus will be on the environmental issues.

Ministry of Health and Prevention

The ministry, which was established in 2007, is in charge of the administrative functions in relation to the organisation and financing of the health care system, psychiatry and health insurance as well as the approval of pharmaceuticals and the pharmacy sector. Prevention and health promotion including the food area are also part of the Ministry's remit. Especially two agencies under the ministry contribute to the efforts within the Food and Health area:

- Sundhedsstyrelsen (the National Board of Health) is the supreme health care authority in Denmark assisting the minister for Health and Prevention within the administration of the health care service. The agency also advises the ministry for Health and Prevention as well as other authorities and informs citizens on specific health issues. The activities of the National Board of Health within the Food and Health area is focused on nutrition but includes also food safety issues.
- Statens Serum Institut (SSI) is a state-owned enterprise under the Danish Ministry of Health and Prevention. For more than a century, the Institute's main task has been to control infectious diseases. The overall objective of SSI is to ensure research-based prevention and control that can deal with current infection-related problems and anticipate and prevent new threats. The core elements are epidemiology, specialized diagnosis, biological safety preparedness and ensuring the supply of vaccines. As such the SSI plays an important role in the national preparedness to prevent infectious food born diseases.

Danish Ministry of the Environment
The contribution of the Ministry to research on food related topics is organised of the **Danish Environmental Protection Agency.** The Danish EPA contributes to setting out targets and preparing strategies and action plans as the basis for government work. The work includes strategies for waste, environmental factors and health, and action plans on chemicals and eco-technology. Work is in close cooperation with the EU, Danish environment centres, regions and municipalities. Specialist insight and up-to-date environmental knowledge are paramount to performing the responsibilities optimally. The agency therefore takes care to collect data and knowledge about environmental impacts and monitor developments in the state of the environment. The agency carries out R&D-projects and develops and maintains around 60 environment databases. New knowledge is communicated in guidelines and publications, through a comprehensive website packed with relevant and topical EPA information, as well as active press and media work.

The agency is contributing to the food related research via a target research programme on pesticide. This program is in broad terms directed to research on the risk assessments aspects of the impact of pesticides on the environment and humans including exposure of consumers via food. The program is managed by the Danish Agency for Science, technology and Innovation.

Private – non-profit – organisation
The Danish Cancer Society is a private non profit organisation mainly financed by private donations. The DCS is active in many areas related to cancer and does also participate in national and international research projects. This research includes projects related to the food area. The research is financed by internal resources as well as by public funding.

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Ways for identification of needs include political priorities and recommendations from scientific panels and bodies. Recently, a public consultation on the research need in the coming years was organised by the Danish Agency for Science, Technology and Innovation. Based on this extensive consultation to which Ministries, research councils, members of the business establishment and other interested parties from wide parts of society have contributed, a catalogue or strategic programme - the Research2015 catalogue – was drawn. This catalogue is a systematic, thorough and forward-looking basis for a political prioritisation of the effort areas of strategic research. Research on health and food is an important part of the catalogue.

The steps of Research2015:

Phase 1 – mapping of research needs (7 months):
OECD conducted an international horizon scan of recent expert reports and analyses, international think tanks and foresight, national and international reports, strategies and action programmes. It resulted in 125 suggestions of development trends and societal challenges. Next step was a public internet based hearing where everyone could participate. It resulted in further 365 proposals from the general public, companies, researcher, universities and organisations.

Phase 2 – identification of themes (2 months):
An independent team of experts analysed the proposals and the OECD scan and identified 42 proposals for strategic research themes. These proposals were the starting point for a workshop with a user panel with representatives from trade, industry, the public sector and civil society. After the workshop the expert team reduced the suggestions to 32.

Phase 3 – final proposal (4 month)
The 32 proposals was then used for a dialogue between the Danish Agency for Science, Technology and Innovation other ministries and research councils and resulted in 21 themes that can be seen at http://en.fi.dk/publications/publications-2008/research2015-a-basis-for-prioritisation-of-strategic-res/?searchterm=research2015

In other cases the ministries has a research board where users, organisations and universities are represented.

3) What are the coordination mechanisms?

There are two coordination bodies:

1. ***The Danish Research Coordination Committee*** is founded in order to ensure coherence between all government research funding, whether it is allocated at institutions or under the auspices of foundations.

The DRCC coordinates work in relation to issues of joint interest to the: Danish Council for Independent Research, Danish Council for Strategic Research, Danish National Research Foundation, High Technology Foundation, Danish Rectors' Conference, Danish Government Research Laboratories' Steering Committee, Danish Council for Technology and Innovation. In this connection, the DRCC promotes Danish international research activities and collaboration with the Faroe Islands and Greenland. Furthermore, the DRCC prepares joint guidelines for the performance of the funding function of the Danish Council for Independent Research and Strategic Research. Finally, the DRCC advises the Danish Minister for Science, Technology and Innovation as well as the Danish

Parliament and the Government on support for research training. Private and public institutions may also seek advice on research training.

The Danish Research Coordination Committee, which consists of a chair and seven members, is comprised of the chairs from the: Danish Council for Independent Research, Danish Council for Strategic Research, Danish National Research Foundation, High Technology Foundation as well as two members from the Danish Rectors' Conference, one member from the Danish Government Research Laboratories' Steering Committee and one member from the Council for Technology and Innovation.

2. *The Danish Council for Research Policy* giving the Minister for Science, Technology and Innovation research policy advice. The Danish Parliament and any minister can also obtain research-related advice from the Council. This advice is given upon request or upon the initiative of the Council.

The Council's responsibilities generally include advice on Danish and international research policy for the benefit of society, including advice on: Framework conditions for research, Funding for research, Major national and international research infrastructures, Development of national research strategies, Denmark's role and position in international research collaboration and Research training and recruitment of researchers. There is 9 members all appointed in their own capacity.

4) How are the national programmes set up and shaped?

See Research 2015 under 2). After the catalogue of themes is formed a political process is started. During the yearly discussion of finances in the government the catalogue or a similar investigation is the starting point for discussion and advice is given by different experts but finally it is the political parties that suggest and promote special subjects for funding during the following years. The Ministry for Science, technology and Innovation is a very active partner in these discussions.

Organisations representing industry, the agriculture sector or the health sector can in different way influence the national programmes. E.g. has the dairy sector has a private research fund open for proposals from university researcher. The funding obtained in this way is used as co-financing in proposals for the research council and can first be used if the project obtains the public funding. The Danish Cancer Society is operating in the same way.

5) Why and how are transnational calls implemented?

The researchers can apply for start up funding from the research councils for international calls and they can get help and information about different programmes and how to apply for funding from EuroCenter acting

as a knowledge, service and dissemination centre. The Danish universities are in progress setting up local help for researchers who want to make a proposal.

The average Danish researcher is more than willing to participate in international collaborations. They are, however, many times reluctant because of the following administrative load. It would be a good idea to give the researchers access to a body that can help them with administrative work after they have got the funding.

The Danish Agency for Science, Technology and Innovation contributes to international developments in areas where Denmark has special competencies or where Denmark especially wants to influence international developments e. g. through three innovation centres in Silicon Valley, Shanghai and Munich. All three centres initiate symposiums and meetings for Danish researchers and companies.

The Agency's activities also include coordination of Danish participation in international research collaboration primarily within the EU, but also within organisations such as NATO and the OECD and they are responsible for the Danish memberships of, among others, ESA, CERN, ESO, EMBL, COST and EUREKA.

6) How are cross-border research programmes set up and implemented?

The Nordic countries have a long tradition for transnational research cooperation, including research related to food, which is organised and coordinated via the Nordic Council and/or Nordic Council of Ministers. Furthermore, the Nordic Innovation Council is financing R&D-projects aiming to develop the Nordic industry including the food industry, which is one of the most important industry areas in the Nordic countries.

The Danish Agency for Science, Technology and Innovation Nordic collaboration includes the Nordic Council of Ministers and the Nordic Committee for Co-operation (NOS), with the participation of the scientific research councils.

The Nordic Council is the forum for Nordic governmental co-operation. The Danish Ministry of Science, Technology and Innovation and the Danish Ministry of Education both take part in the work of the Nordic Council of Ministers for Education and Research.

NordForsk is a newly founded research political board operating as an independent board under the Nordic Council of Ministers for Education and Research.

NordForsk is responsible for Nordic collaboration in research and research training as well as responsible for the cooperation and coordination with the Nordic Innovation Centre (NICe). NICe is an institution under the Nordic Council of Ministers for Food Policy (MR-N) and has as objective to promote innovation and competence development in the Nordic business sector.

The scientific research councils of the Danish Council for Independent Research (DFF) take part in the Nordic cooperation by way of the Joint Committees of the Nordic Research Councils (NOS). NOS is a cooperation committee for the Nordic research councils. The NOS committees support research projects as well as the implementation of the programmes and seminars of the Nordic Centres of Excellence, the latter in collaboration with The Nordic Council of Ministers and NordForsk.

The research activities are financed 'bottom-up' by the participating research councils. Through the joint committees, the councils also keep each other informed about research development within the respective countries. Furthermore, the NOS-committees stay in continuous contact with the Nordic Council of Ministers, NordForsk and the Baltic research councils.

7) Is there a (need to) move from coordination to integration and how?

Results of the SAFEFOODERA project under FP6 show that this is a rather complex and difficult matter without any clear answer. Moving from coordination to integration will probably solve some problems but at the same time make others. Advantages and disadvantages will vary from programme to programme and should be evaluated on a case by vase basis.

8) What are the cooperation initiatives?

It is not possible to get projects funded in Denmark without cooperation between research groups and/or industry except for single PhD and post doc grants.

Once a year the Strategic Research (DSF) invites applications for supporting collaborative research between SMEs and ongoing research projects. The cooperation with relevant SMEs must be new, at the time of application and funds can be applied for in a contact phase through advertising inviting toa broad cooperation.

The budget should only include costs directly related to the cooperative project. Support will be a maximum of 60% of the participating SME costs and 100% of research institution costs. The support given to companies is within the framework of the EU Commission rule No N460/2006 of 20 February 2007. One can apply for 90.000 euro.

Industrial PhD is supported by the Danish Ministry of Science, Technology and Innovation. The Industrial PhD Programme strengthens research and development in Danish business communities by educating scientists with an insight into the commercial aspects of research and development and by developing personal networks in which knowledge between companies and universities can be disseminated.

Instead of a private company, a public institution or organisation can participate in an Industrial PhD project. This supports the focus of the public sector on improvement through focused, practical and research-based projects as a part of the government quality reform. Public Industrial PhD projects are not eligible for subsidy.

More information can be found at http://en.fi.dk/research/industrial-phd-programme

9) How is multidisciplinarity addressed?

Most strategic research programmes is framed (with the help of experts within different areas) with an inherent need for multi-disciplinarity' as a necessary basis for fulfilment of the defined goals of the programmes. Furthermore, is a general recommendation in most Danish strategic research programmes that proposals are based on cooperation between 2 or more different (Danish) research institutes.

There is however a big problem for the researcher willing to combine different fields. In order to qualify as a top researcher publication in international journals with high impact factor is absolutely necessary – BUT the high impact journals (and even the low impact journals) is highly specialised and discipline oriented and they are not accepting multidisciplinary papers – a clash of interests.

10) How is transfer of technology - From knowledge to business - ensured?

It is a general demand that applicants to the research programmes should state their intention and plans for information about the project and for dissemination of the results of the work. This can include reports, web-sides and public seminars. Publications in scientific papers are indeed important, but plans for information about the project should not be limited to scientific journals.

Collaboration with industry (or e.g. national health care) is wanted in many of the programmes. It is, however, many times only the bigger industries that can apply the results immediately after the projects are finished. Very often it is a yearlong cooperation between SME's and research that gives the best knowledge transfer. As a rule of thumb - there is often 10 years

between the start of the basic research and the industrial utilisation. It is very difficult to set knowledge transfer in system but a way can be over a system of self owned, non-profit institutes as the Danish Technological Institute http://www.dti.dk/ or DHI Group http://www.dhigroup.com/

11) How are Intellectual Property Rights addressed?

General rules for Intellectual Property Rights are described in the Danish legislation. More detailed agreement valid for a funded project is laid down in a contract between the collaborators of the project. Such a contract is a demand from the funding body. Every university and institute follow the rules and a contract of cooperation is set up before the projects start.

12) How is innovation supported?

Denmark has a specific R&D-programme directed to innovation. The goal of this programme is to develop the Danish industry. Furthermore, Danish research institutes can also apply to the Nordic Innovation Centre for resources to R&D innovation project, which in this case must involve at least 3 Scandinavian countries.

One way is technology and innovation incubators e.g. as seen for the Danish Technical University (DTU):

DTU's many test facilities are also available to the business community. Use of the facilities is either part of a collaboration project between the business and the department/centre and possibly other collaborative parties or an arrangement where the business rents the facilities. The science park, Scion DTU, can development departments of high-tech businesses or small new entrepreneur businesses rent office space and thereby gain access to the facilities and competences. The science park works as a link between public sector research on one side and on the other innovative businesses which contribute to the development of new products, technologies and jobs. DTU's own innovation company, DTU Symbion Innovation, assists potential entrepreneurs in finding out whether there is a sustainable basis for attempting to establish a new high-tech business. Later in the process, they can e.g. also assist in raising venture capital through an extensive network of the necessary investors.

More other Danish universities offer services in the same way.

13) How is knowledge intensive research promoted?

I can not understand the question. In my opinion all research is knowledge intensive.

14) How is public/private partnership encouraged?

The demand for cooperation and actively involvement of public and private partners in a research project depends on the individual programme. Projects under the R&D programme for innovation will only be funded if there is one or more private partners involved, but these partners will only be able to obtain up till 50% funding of their expenses, while a public institute can have up till 100% coverage. For other strategic research programmes not directed directly to innovation, the demand for public/private partnership is not an absolute demand but still a recommendation and it might be of some importance when the decision about funding is taken.

15) Additional information not covered above

16) Additional Comments

So far the possibilities in Denmark for financing of transnational research cooperation, besides cooperation under the EU-FPs, have been rather limited. However, there is a growing understanding that transnational research cooperation is necessary to solve the many global problems including problems in the food-area. At the same time the understanding, that it is important to have more flexible rules for participation in bilateral research cooperation, is also growing. This has caused a whish for a change of the rather tight legislation for research funding in Denmark to a more flexible system that allows Danish contribution to funding of transnational research cooperation.

Contribution of Pr Éric Dufour, Dr Valérie Baduel, Dr. Rafael Garcia-Villar from France

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Many organisations are involved in funding and direction of programmes. The main ones are:

- Agence Nationale de la Recherche (ANR) – Type of organisation: Agency; Main areas: funding of research projects
- Fond Unique Interministériel (FUI) – Type of organisation: Ministries; Main areas: funding of 'Pôles de Compétitivité' (competitiveness clusters) projects
- OSEO - Type of organisation: Public organisation; Main areas: To promote innovation in SMEs
- Conseils Régionaux - Type of organisation: Regions: Main areas: funding of research projects
- Organisations Interprofessionnelles des filières - Type of organisation: Non-profit; Main areas: funding of R&D projects coordinated by agro-industrial technical centres
- Public institutes with research missions (eg. Afssa, CEA, Cemagref, CNRS, INRA, INSERM, - Type of organisation: Public bodies; Main areas: selection, funding and implementation of research work. These organizations act with their own resources, or in partnership (2 or 3 organisations).
- Ministries (MESR, MAAP) - Type of organisation: Government; Main areas: funding of research institutes and agro-industrial technical centres; definition of national policy for research and innovation.

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

National priorities are set with reference to government policies and priorities. Regions also define their priorities.

Needs are identified through different mechanisms. Generally there is a consultation with stakeholders, with experts,… 'Pôles de Compétitivité' (competitiveness clusters) are playing a more and more important role in identifying needs. This is in relation with the general trend to increase focus on areas that are seen as having potential to benefit the economy in France.

The collective expertise conducted by Afssa in the framework of the scientific risk assessment regarding food safety (including nutrition) identifies data and knowledge gaps. These opinions provided to the French authorities give advices on the studies or research works to be implemented, in support to the risk assessment.

The members of the Advisory forum of the European food safety authority (EFSA) discuss periodically about the needs of research identified by the risk assessors which have to be proposed, by EFSA, to the DG Research. DG research representatives were also invited to exchange with the advisory forum last year.

Even if it is not related with the food and health field, it may be interesting to analyse the functioning of the 'Réseau français de santé animale' (French network on animal health), mirror group of the ETP Global Animal Health. Indeed, this network join together in a very constructive approach all the stakeholders involved in the animal health in France: public authorities, publics bodies, veterinary drug industries, private inter-professional organizations. This group addresses reflections and proposals to the national research funders and to the ETP.

3) What are the coordination mechanisms?

Various mechanisms exist as regards coordination. Coordination exists between ministries: the priorities are defined by cross-government working groups.

Coordination between the national level and the regional level is based on the discussions between the Government, Préfets de Région (regional representatives of the Government) and Regional Councils (4 years State-Region Project Contracts).

4) How are the national programmes set up and shaped?

The general scheme in France can be summarized as: (i) Research **orientation**, by government; (ii) **Programming,** by ANR and research organisations (iii) **Implementation,** by large research organizations and other research providers (universities, private institutes, technical centres, etc.).

Within the Agence Nationale de la Recherche (ANR), a preliminary dialogue is implemented between ministries, public bodies (like the research organisms and the risk assessment agency) and the other stakeholders: the priorities are defined by scientific and strategic committees. Then, ANR elaborates the work programs and launches calls.

In France, the ALID programme (Sustainable Food Systems), launched in 2010 by ANR and following ALIA programme, aims to build sustainable

systems for production, processing, distribution and consumption of food products, taking into account consumer demand, competitiveness of enterprises, protection of ecosystems in the context of global changes. This programme aims to develop a global integrated approach of the food chains based on interdisciplinary projects.

5) Why and how are transnational calls implemented?

France is positive about international collaboration. Most research calls from ANR are based on open competition and collaborations with foreign countries are encouraged (for example, there is a joint call between FR & DE in the ANR-ALIA research programme in the area of FOOD and NUTRITION). The Ministry of Foreign Affairs has also a specific programme with international bilateral calls.

Transnational calls are generally implemented because research bodies (on their own initiative or taking the opportunity of external funding/FP for example) consider that these kind of collaborations represents a real mutualisation of competences and equipments. Moreover, as they put in relation researchers from different countries, distinct approaches are mixed in a synergistic manner. In addition to some transnational calls implemented by the ANR, we can highlight a successful example of transnational call: the network of excellence Med Vet Net (coordinated by Afssa) funded under the 6th FP. After five years of a very fruitful cooperation between 16 research bodies coming from veterinarian, biologist and medicinal fields, the members have decided to continue their 'common story' with the creation of an association. The successful multidisciplinarity (see question 9) is one of the main results of the NoE.

6) How are cross-border research programmes set up and implemented?

A wide variety of approaches is used such as INTERREG, bi-lateral agreements between funders, collaborations between French 'Pôles de compétitivité' and German clusters (Kompetenznetze), …

7) Is there a (need to) move from coordination to integration and how?

European programs (like FP, Community public health programs) in general, ERA-Nets, European platforms and their mirror groups more particularly, have started the move. However, it is not clear how foreign research groups could benefit from national funding (eg. from ANR). Joint Programming will most probably be the next step.

Coordination appears always as an added-value. Integration is a good way to follow, when relevant. Indeed, some research themes (related to cultural, historical, economic or societal reasons) have to be identified and considered

at national levels. In the food and health field, this is particularly true: food is a highly symbolic matter which needs national, if not regional, attention. Moreover, the research works in this 'new' field should be quite different, with for example a particular emphasis on development of tools (databases), on survey,...

8) What are the cooperation initiatives?

One example of transnational co-operation initiative is represented by ANR-ALIA joint call between France and Germany in the area of FOOD and NUTRITION. Also, the 'Regions of Knowledge' initiative on FOOD clusters...

9) How is multidisciplinarity addressed?

As an example, several ANR calls addressing food, human nutrition and consumer's attitudes were designed in order to promote collaborations between research units in the field of sociology, marketing and economics and research units in the field of life sciences and food sciences. ANR also launches 'White calls' i.e. a bottom-up approach aimed at encouraging spontaneous multidisciplinary approaches.

10) How is transfer of technology - From knowledge to business - ensured?

Transfer of technology is ensured by 'Cellules Mutualisées de Valorisation (mutualised units for valorisation) in the Universities (ex. the SAIC departments, Services des Activités Industrielles et Commerciales), or transfer units or subsidiaries of research organizations (ex. INRA- transfert, INSERM Transfert...) which are involved in the detection of knowledge that may be transferred and in the proof of concept, by enterprise incubators, by venture capital, …. At the moment there is a complete chain in France, from research laboratories to entrepreneurship.

'Pôles de Compétitivité' (competitiveness clusters), joining together public and private research and commercial organizations, are particularly attentive to the question of the transfer of technology. In the area of the Agrofood chain, the so-called 'Instituts techniques' (agro-industrial technical centres) also contribute to transfer (ex. those included in ACTIA, the association for the coordination of agro-industrial technical centres). ANR calls also promote the transfer of technology.

11) How are Intellectual Property Rights addressed?

The main organisation in France for this field is INPI (Institut National de la Propriété Industrielle; Ministry of Industry); other organisations such as OSEO (National Agency for Innovation (SMEs) or ANRT (National association for research & technology; industries) are also involved in addressing theses

issues on behalf of their stakeholders. IPR are generally considered before the beginning of the collaborative works, in the collaborative agreements signed between the legal representatives of the different parts involved in order to reach the more relevant sharing, depending on the respective status of the partners (public or private).

12) How is innovation supported?

This is a very broad question. A wide variety of approaches is used. It starts with the training of Master and PhD students. The funding of 'Pôles de Compétitivité' projects is another aspect. Recently France has launched his National Research and Innovation Strategic plan: 'health, well-being and food' is one of the 3 priorities.

ANR calls also promote the innovation.

Moreover, 'OSEO Innovation', a dedicated branch of OSEO (the SME's bank) has a nationwide network that promotes innovation in all French regions: specific programmes such as 'Aide au partenariat technologique' can help French SMEs to get involved e.g. in European research projects.

13) How is knowledge intensive research promoted?

Certainly by ANR specific calls. Nevertheless, the so-called 'Pôles de Compétitivité' (industry leaded Public-Private Partnership clusters involving research and industries, and funded by the 'FUI' programme (Fonds Unique Interministériel) are probably the most advanced French initiatives aimed at promoting Knowledge-Intensive access to market of innovative products; there are also other types of cooperation structures such as the 'CRITTs' (Centres régionaux pour l'innovation et le transfert) or the spin off 'incubators' that promote knowledge-intensive business.

14) How is public/private partnership encouraged?

(See above) At the moment, 'Pôles de Compétitivité' (competitiveness clusters) and ANR calls are the main instrument to develop public/private partnership. There are several of such 'Pôles de Compétitivité' (Valorial, Vitagora, Qualimed, Prod'Innov, InnoViandes, …) addressing issues in areas connected with Food and Health. For more info, see: http://www.competitivite.gouv.fr/)

Contribution of Ms Claudia Vallo and Ms Petra Schulte from Germany

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

The public funding in general is mainly divided in two pillars, pure academics is fostered by research organisations such as DFG, Max-Planck and others. Project funding is provided by federal and state ministries. The ministries usually delegate the funding administration to agencies (Projektträger). Some ministries maintain dedicated research institutes (Ressortforschung).

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

The needs of stakeholders are usually collected via expert rounds, workshops and other communication tools. There are no dedicated rules for that.

3) What are the coordination mechanisms?

4) How are the national programmes set up and shaped?

Currently there is no dedicated national programme within the nutrition sector in Germany. However there are theme specific schemes run by the Federal Ministry of Education and Research (BMBF), funding possibilities in fundamental research by Deutsche Forschungsgemeinschaft (DFG) as well as institutional funding of respective research institutions on federal and 'Bundesländer' level.

5) Why and how are transnational calls implemented?

There has not been any transnational call in food & health yet.

6) How are cross-border research programmes set up and implemented?

There are no transnational programmes so far beside European programmes such as EuroStars, Eureka, ESF etc.

7) Is there a (need to) move from coordination to integration and how?

As there is not much coordination yet, integration can only be the second step.

In Germany, the Federal Ministry of Education and Research intends a specific funding pillar for health and nutrition. Within the 'Hightech Strategy' of the Federal German Government food, nutrition and health will become increasingly important – one of the key projects of the future is 'more health through targeted prevention and nutrition'.

8) What are the cooperation initiatives?

9) How is multidisciplinarity addressed?

In certain funding activities multidisciplinarity is already an eligibility criterion – and is in general getting more and more important, as for example the disease-related competence networks on obesity or diabetes that integrate national experts from different medical and scientific disciplines who are working in this field.

10) How is transfer of technology - From knowledge to business - ensured?

In BMBF schemes joint research projects with at least one partner of science and one of industry are generally preferred.

In the German Federal Ministry of Education and Research some schemes for joint research projects are dedicated to cooperation of academics and industry. In universities and research institutes technology transfer is institutionalised via tech transfer bureaus and agencies.

11) How are Intellectual Property Rights addressed?

In the project funding in general IPRs are regulated via Consortial Agreements for each project. Within universities and companies IPRs are regulated by law.

In Germany, some patent service institutions are responsible for the application of IPRs and services around IPRs in the universities.

12) How is innovation supported?

Project funding is intended to be 'applied' research – so innovation is inherently addressed.

13) How is knowledge intensive research promoted?

No specific activities

14) How is public/private partnership encouraged?

Public private partnerships are desired for most of the project funding activities, as they aim to support applied research.

15) Additional information not covered above

16) Additional Comments

The questions seem to be really broad and a bit unspecific. It is not always clear whether the food sector or the funding as a whole is addressed.

Conclusions:

R&D landscape is still highly scattered, BUT - There is a bunch of attempts by different actors to overcome fragmentation and to develop joint activities (Technology Platform, Joint Calls (ALIA), newly found CWG und SCAR, Expert group food & Health, previous and upcoming ERA-Nets etc.).

A communication between these activities must be established. The newly introduced JPI 'Healthy diet for a healthy life' and its CSA, which is broad based and truly member state driven, delivers for the first time a platform, which is sufficiently mandated by all participating European countries, to address this major issue.

It is imperative to allow all member states, stakeholders and European entities to easily contribute to the initiatives and activities under the JPI.

These common coordinated activities on all levels may comprise:

1) Communication of all partners on planned/upcoming initiatives

2) Adjustment of topics in common transnational calls, national programmes, the frame work programme etc.

3) Overarching scientific aspects such as standardisation, data sharing, sharing of infrastructure, capacity building etc,

4) Legal aspects such as IPR, organisation of tech transfer etc.

Contribution of Ms Effie Tsakalidou from Greece

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

The answers below were based on personal experience and also communication with the funding bodies involved. They were also discussed with colleagues active in the field of food (and health). An additional significant source was the document CCI: 2007GR161PO001 on the National Strategic Reference Frame (ESPA) 2007-2013.

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Three ministries are mainly involved in the Food research area, namely the **Ministry of Development** (more specifically, the General Secretariat for Research and Technology, which is the major research funding source), the **Ministry of Education**, and the **Ministry of Rural Development and Food**.

The **Ministry of Development** opened during the period 1985-2003 relevant calls on a quite regular basis. The area of Food appeared under the general umbrella of 'Agriculture, Fisheries, Livestock Production, Food and Biotechnology'. However, no specific emphasis was given on the topic Food and Health. Still, human nutrition topics appeared more often year by year. Interestingly, no calls appeared since 2003, not only in the area of Food but also in general. The first new calls, after 6 years of inactivity, appeared in summer 2009. Surprisingly, the umbrella 'Agriculture, Fisheries, Livestock Production, Food and Biotechnology' seems to have been replaced by the one of 'Biotechnology'. Food becomes a tiny part of this, while Food and Health related issues are quite limited.

The **Ministry of Education** opened in 2002 for the very first time calls for PhD (twice) and post-doctorate studies (twice). There are no specific topics. Candidates are free to submit their proposals on a topic of their interest. No statistic data exist about the distribution of topics per main scientific area.

It should be stressed that in 2010 the General Secretariat for Research and Technology has been transferred from the **Ministry of Development** to the **Ministry of Education**, with the latter one being now the focal Ministry for funding research in Greece.

Finally, the **Ministry of Rural Development and Food** usually proceeds through the direct assignment of projects, which mainly deal with primary production, agricultural economics and rural development.

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

In Greece, responsible for the policy-making in Research and Technology at national level is the National Council for Research and Technology, which was established in 1985. The members of the council represent mainly the academia and in lesser degree the industry and business community.

According to the most recent consultation procedures, the new strategic priorities for Research and Technology are as follows:

- Increasing the demand for new knowledge and research results in Greece
- Re-organization of the research system and provision of knowledge in Greece
- 'Freeing-up' the Greek research system and opening it further to the international field
- Development and Technological infrastructure in the context of a policy for Science and Technology
- Thematic and Sector priorities for a policy on Science and Technology
- Qualification of goals

3) What are the coordination mechanisms?

As mentioned above the National Council for Research and Technology is the official policy-maker in the field of Research and Technology. On the other hand, the detailed scientific content of programmes is developed and formulated by scientific expert bodies, which represent mainly the academia and in lesser degree the industry and business community.

4) How are the national programmes set up and shaped?

The detailed scientific content of programmes is developed and formulated by scientific expert bodies. Before opening the calls and for a short period of time, the programmes are open to consultation with all relevant parties, academia, industry and consumers.

Recently, in the frame of the European Technological Platform 'Food for Life' the respective national platform has been created (launched 2009). This was an initiative of the Federation of Hellenic Food Industries (SEVT) and the Food Industrial Research and Technological Development Company (ETAT SA). Representatives from all Greek Universities and Research Centers dealing with Food (and Health) have also joined and contributed to this effort. The platform is expected to play a significant role in the policy-making procedures about the research priorities in the area of Food (and Health).

5) Why and how are transnational calls implemented?

So far, and as far as the major research funding source is concerned (the General Secretariat of Research and Technology, previously with in the Ministry of Development, but since 2010 with the Ministry of Education), there were specific calls for bilateral collaborations between Greek research groups and groups in other European countries, member states or not. In recent years (2001-2003), these collaborations were expanded beyond the European area, e.g. USA, Canada, Oceania, China etc. Taking into account the number of applications and the scientific outcome, the latter collaborations are considered among the most successful programmes ever in the history of the General Secretariat of Research and Technology. Interestingly, the new Cooperation programmes of the National Strategic Reference Frame (ESPA 2007-2013), launched in summer 2009, are all open to international collaborations, bringing thus in practice the new national policy, which supports the ''freeing-up'' the Greek research system and further opening to the international field. It is expected that this will contribute to the enhancement of the collaboration potential of Greek research groups in EU funded projects, both quantitatively and qualitatively.

In the case of the Ministry of Education, the involvement of groups from other countries is encouraged and subsidised.

6) How are cross-border research programmes set up and implemented?

See point 5.

7) Is there a (need to) move from coordination to integration and how?

One can claim that, so far, there was inadequate coordination among the various national bodies involved in the policy-making. Moreover, fragmentation of financing was the usual procedure. Nowadays, the introduction of the Measure 4.6 in the revised Operational Programme Competitiveness and Enterprising (EPAN) is considered a significant progress. Through this measure, the strengthening of innovation is promoted in an integrated way. Furthermore, actions are undertaken in favour of the creation of 'regional innovation poles'. This can considered as a systemic approach, a trend that is expected to be expanded in the 4th Program Period.

8) What are the cooperation initiatives?

In the last 20 years the majority of the projects funded by the General Secretariat of Research and Technology (previously with Ministry of Development since 2010 with the Ministry of Education) supported the cooperation among research groups in Universities and Research Centres, and also among research groups and the industry. This has contributed a big deal

so that the Greek academia and the industry / business community came gradually closer and start communicating better.

As mentioned above, in the frame of the European Technological Platform 'Food for Life' the respective national platform has been created (launched in 2009) as an initiative of the Federation of Hellenic Food Industries (SEVT) and the Food Industrial Research and Technological Development Company (ETAT SA), with the contribution of representatives from all Greek Universities and Research Centres dealing with Food (and Health). The platform is expected to play a significant role in the policy-making about the research priorities in the area of Food (and Health).

9) How is multidisciplinarity addressed?

Significant research activity of high standards and international recognition is carried out by several Greek research groups in Universities and Research Centres. Food related research is carried out in laboratories of several University Departments, such as Food Science, Agriculture, Chemistry and Chemical Engineering, and in several Institutes of the National Agricultural Research Foundation (NAGREF). Additionally, development and applied research is conducted by the R&D departments of certain innovation oriented Greek food companies, mostly in collaboration with the above academic groups.

Research focus on food systems and products of national significance, such as olive oil, dairy products and other traditional products of commercial significance or of importance to the 'Mediterranean diet' concept. Food safety issues and state of the art approaches to assess and manage microbial and chemical risks in food products from production to consumption (or from farm to fork) is the focus of several research groups as well. Functional components or food products including natural antioxidants, probiotic cultures, fermented foods and other ingredients with health impact, as well as the effect of processing on them are areas of significant research too. Novel processes, innovations and optimization of conventional processing, including non-thermal processes, such as ultra high pressure, osmodehydration and osmodehydrofreezing, aseptic processes, supercritical extraction and others are investigated. Food and packaging interaction and novel packaging approaches, such as active, smart and edible packaging are being researched. The above mentioned topics are representative and by no means exhaustive.

Several of these groups competitively participate in state of the art research projects. However, common concern to all research units in Greece is the unstable and uncertain environment with regard to financial support. For instance, state funding for the laboratories of the public Universities is barely sufficient for the mandatory teaching activities, and research can only be supported by participation in projects, the availability of which depends on the National and European policies for the field of food.

10) How is transfer of technology - From knowledge to business - ensured?

In the course of the last 20 years the Greek academia and the industry / business community are coming gradually closer and start communicating better. The research programmes, both nationally and EU funded, have contributed a lot to this direction. Despite this fact and also despite the good performance of the Greek research groups especially in EU funded projects, the transfer of knowledge to business is rather limited and certainly, so far, not encouraging. Also, there is very low activity concerning patenting of knowledge produced (see point 11). For this reason, transfer of technology and patenting of knowledge are among the major goals of the revised Operational Programme Competitiveness and Enterprising (EPAN, 2007-2013).

11) How are Intellectual Property Rights addressed?

Despite the high mobility and productivity of the Greek researchers, which is reflected in the relatively good participation in EU funded projects and the high number of publications produced, there is a significant weak point. This concerns the very low activity regarding the patenting of knowledge produced, which might indicate the low impact of the research results on the scientific and technological development of the country. This issue has been taken into account for the design of the research policy and the configuration of the new strategic research priorities. As mentioned in point 11, patenting of knowledge is among the main goals of the revised Operational Programme Competitiveness and Enterprising (EPAN, 2007-2013).

12) How is innovation supported?

Significant research activity of high standards and international recognition is carried out by several Greek research groups in Universities and Research Institutes in the area of food. At the same time, the Greek food industry is the manufacturing sector with the biggest contribution to the economy at all important indexes, such as sales, added value, employment and number of companies. However, the Greek companies, in general, belong more to the ones that adopt innovation than to those that produce innovation (strategic innovators). Still, recent studies show that there is a trend of change, which is reflected on the increase of expenditure for Research and Development from the side of the food companies.

It should be stressed however, that, so far, innovation in Greece was not sufficiently supported by the state compared to the rest EU countries (25 member states). There was also inadequate coordination among the various national bodies involved in the policy-making as well as fragmentation of financing, e.g. support of individual enterprises instead of a holistic strengthening of all social partners involved and phases encountered. The introduction of the Measure 4.6 in the revised Operational Programme Competitiveness and Enterprising

(EPAN, 2007-2013) is considered a progress. Through this measure, the strengthening of innovation is promoted in an integrated way. In the frame of this measure, the recent application of actions in the favour of the creation of 'regional innovation poles' can be considered as a systemic approach, a trend that is going to be expanded in the 4th Program Period.

13) How is knowledge intensive research promoted?

Many academic research groups can competitively participate in state of the art research projects. However, common concern to all research units in Greece is the unstable and uncertain environment with regard to financial support. State funding for the laboratories of the public Universities is barely sufficient for the mandatory teaching activities, and research can only be supported by participation in projects, the availability of which depends on the National and European policies for the field of food.

As far as the private sector is concerned, several 'influx' indexes (e.g. human resources, innovation expenditure etc.) are similar to the mean European values, some of them even higher. However, 'efflux' indexes show significant drawback. Despite the efforts of the last decades, the expenditure for Research and Development from the side of the industry remains rather low. This might explain the low efficiency of the system as a whole, along with the lack of bonds and interactions between bodies which produce and those which exploit new knowledge. In general, Greek companies/enterprises can be classified more to the innovation adopters than to the innovation producers (strategic innovators).

14) How is public/private partnership encouraged?

As mentioned above (see point 10), the bonds and interactions between the public and private partners are steadily increasing. The research programmes, both nationally and EU funded, have contributed a lot to this direction. This is expected to be further supported by the National Strategic Reference Frame (ESPA) 2007-2013.

15) Additional information not covered above

16) Additional Comments

Due to the current economic crisis in Greece, the national funding is very limited, practically inactive, as the funding through the National Strategic Reference Frame (ESPA) 2007-2013 depends 75% on EU and 25% on the Greek state. For the latter one, negotiations are under way to be reduced, e.g. to 5%, so that this can be made available by the Greek government.

Contribution of Dr Pamela Byrne from Ireland

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Numerous including Ministries, Funding Agencies, Research Institutions.

The Irish Government launched the Strategy for Science Technology & Innovation in 2006 (SSTI). The Office of Science, Technology and Innovation (OSTI) within the Ministry of Enterprise, Trade and Employment is responsible for the development, promotion and co-ordination of Ireland's Science, Technology and Innovation policy; and Ireland's policy in European Union and international research activities.

The SSTI 2006-13[5] constitutes one of the principal pillars of the Irish National Development Plan (NDP) and strives towards a vision of Ireland in 2013 which is internationally renowned for the excellence of its research and at the forefront in generating and using new knowledge for economic and social progress, within an innovation driven culture. Over the lifetime of the NDP the Irish State will invest €6.1 billion in STI as detailed in the programme areas below.

- World Class Research STI €3,462 million
- Enterprise STI €1,292 million
- Agri-Food Research €641 million
- Energy Research €149 million
- Marine Research €141 million
- Geo-science €33 million
- Health research €301 million
- Environment Research €93 million

The investment in human capital, physical infrastructure and commercialisation of research outlined above is complemented by investment in initiatives set out in the NDP allocations for Higher Education and the IDA. Taking account of these amounts, the global NDP investment in STI in the NDP amounts to €8.2 billion. The roadmap for achieving the vision has been developed by the Interdepartmental Committee on Science, Technology and Innovation, under the aegis of the Cabinet Sub Committee on STI and has benefited from the input of all major research performing Departments.

5 http://www.entemp.ie/publications/science/2006/sciencestrategy.pdf

One of the key actions of the Strategy was to develop a range of **cross sectoral research initiatives** in the key public good research areas. Government departments were invited to put forward ideas to an interdepartmental committee for cross sectoral research programmes following interdepartmental consultation.

In Ireland, the Ministry of Agriculture, Fisheries and Food have responsibility for funding food and agriculture research whilst the Ministry of Health and Children are responsible for supporting the Health Research Board (HRB) who are main funder of health related research in Ireland.

Following consultation between the two Ministries and the HRB, a cross sectoral programme in Food for Health Research was developed in 5 key areas – National Nutritional Phenotype Database; National food consumption databases for food safety and nutrition; Gut microbiota as an indicator and agent of nutritional health in elderly Irish subjects; Safe and Healthy Foods and HRB Centre for Health and Diet Research (CHDR).

In addition, Enterprise Ireland[6], the Enterprise Agency of the Department of Enterprise, trade and Innovation, has supported a Food for Health Ireland Initiative which is a public private partnership between four research organisations and four of the large indigenous Irish dairy companies.

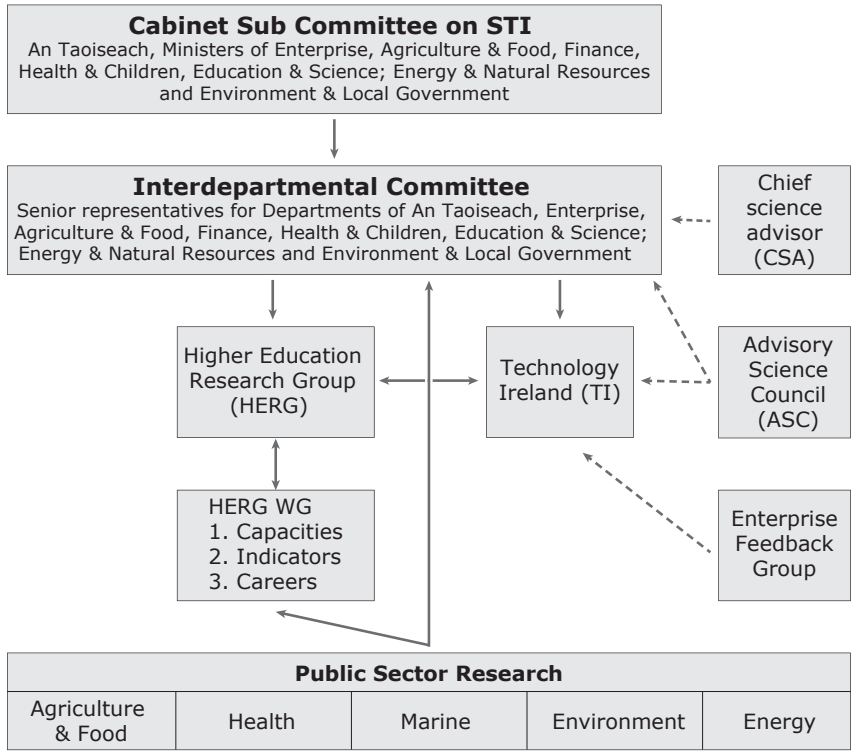
2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Whilst the DAFM, DHC and HRB are responsible for developing research programmes in agriculture, food, fisheries and health, in accordance with their own mandates, in the area of food and health a cross-sectoral approach was deemed to be the best way forward. Prior to the submission of the cross-sectoral research programme to the Interdepartmental Committee for consideration (see above), stakeholder consultation was undertaken involving government departments, industry, agencies and the research community.

6 EI supports a number of national policies/programmes/initiatives in the food/nutrition/diet/health space. At an overall policy level EI is the national agency with responsibility for enterprise development, specifically, the indigenous industry base. The food sector is of critical importance to the Irish economy (Sales €18billion, exports €8billion, 54,000 employed) and has traditionally been the major contributor to annual export gains. There are 250 companies who are regarded as the key industrial footprint (sales €14billion, exports €7.5billion, 37,000 employed) ranging from MNCs to large indigenous, SMEs and HPSUs across the various food sectors (dairy, meats, consumer foods, beverages, marine, bakery, feed etc). There are a large number of companies of all sizes within this group that have commercial and research interests in the food-health agenda. It is within this context that EI has supported a number of policies and programmes to support the Food and Health industrial sector.

3) What are the coordination mechanisms?

The Co-ordination mechanisms for STI in Ireland are presented in the following diagram:



4) How are the national programmes set up and shaped?

National programmes are developed in accordance with the policy of the relevant Government Department. For example in the food area, the Agrivision 2015 Action Plan[7] is the roadmap for the Ministry of Agriculture, Fisheries & Food which includes how research will support the development of a competitive knowledge based agri-food industry. In addition to the Action Plan, there is an industry led R&D group which includes representatives from the food industry, food agencies, enterprise and the research community. The mandate of this group is to develop the research agenda for the Irish agri-food industry for the future and in addition, they act as the National Technology Platform linked to the ETP Food for Life. In the area of health, the HRB have their corporate strategy[8], the vision of which is to enable a world-class health system in Ireland through excellence in research and to contribute

7 http://www.agriculture.gov.ie/media/migration/publications/2006/AgriVision2015.pdf
8 http://www.hrb.ie/fileadmin/Staging/Documents/RSF/PEER/Policy_Docs/Relevant_reports/corporatestrategyenglish.pdf

actively to the knowledge economy. The Health Research Group, set up following a recommendation by the Advisory Science Council (ASC), has the mandate to develop a health research agenda and is currently developing a Health Research action Plan.

5) Why and how are transnational calls implemented?

The Food for Health Research Programme was open to researchers from northern and southern Ireland with the lead research Institution based in the southern Ireland. Open calls were advertised in the national press and on the funding agency websites. The Department of Agriculture, Fisheries & Food was responsible for the management of the first four programmes listed under 1 above and the HRB was responsible for the management of the fifth programme. Following receipt of research proposals, international experts were invited to remotely evaluate proposals following which a panel meeting was held and a consensus evaluation undertaken. Experts included representatives from academia and regulatory agencies. All research proposals involved consortia and included research performers from northern and southern Ireland. Each programme brings together multidisciplinary research teams to build on, and further develop, existing expertise and to ensure greater utilization of Ireland's capability in Food and Health research through inter-institutional collaboration. Further details and call documentation call be provided if required.

6) How are cross-border research programmes set up and implemented?

See above

7) Is there a (need to) move from coordination to integration and how?

8) What are the cooperation initiatives?

The major co-operation initiative in Ireland in the last 3 years was the allocation of funding under the Interdepartmental Committee. This is explained above. In addition, many funding agencies co-operate in the development of calls for research and the evaluation of research proposals.

9) How is multidisciplinarity addressed?

Multidisciplinarity is encouraged where appropriate and many projects are collaborative and involve research groups from all aspects of food research, nutrition, chemistry, health, medicine, statistics, food business etc..

10) How is transfer of technology - From knowledge to business - ensured?

The transfer of technology from the Food for Health Research Initiative is managed by a Dissemination/Knowledge transfer project entitled RELAY funded by the Ministry of Agriculture, Fisheries & Food. This project employs disseminators who liase with the researchers and write project alerts/ updates over the duration of the project. This project is also responsible for organising industry focused workshops at which the results of the research projects are presented to end users including industry and regulators. In addition to this project, all projects have to develop their own dissemination programme and ensure that research outputs are presented to end users. RELAY also works closely with the technology transfer initiatives of other Government Ministries.

11) How are Intellectual Property Rights addressed?

In 2004, Ireland developed a National Code of Practice for the protection of IPR arising from public funded research. It is the responsibility of the researchers funded from public funds to ensure that they protect IPR in accordance with those guidelines. Additional supports for the protection of IPR have been put in place in many of the research institutions in Ireland through funding from the Ministry of Enterprise, Trade and Employment and their Enterprise agency – Enterprise Ireland. Commercialisation specialists are located in many of the large universities and institutes of technology and their remit is to ensure that technology transfer is managed appropriately and commercial opportunities are realised. The Ministry of Agriculture, Fisheries and Food also supports the appropriate management of IPR through its dissemination project, RELAY, referred to above. Experts liase with the researchers at the early stages of their research to develop a commercialisation strategy for those projects which may have commercial potential.

12) How is innovation supported?

Innovation is supported by all funding agencies. The Ministry of Agriculture, Fisheries and Food funds public research organisations and supports innovative research. One major initiative in Ireland – the Alimentary Pharmabiotic Centre, based in the South, is funded by Science Foundation Ireland and is a collaboration between Irish researchers and the Pharma Industry. It main focus is alimentary health research and understanding the impact of gut microflora of health. See http://www.ucc.ie/research/apc/content/ for further details.

In addition, the food and pharma industry are supported by the Enterprise agency – Enterprise Ireland. This agency has a mandate to develop the R&D activity in private industry. It achieves this through the support of R&D

in-company. It also supports proof-of-concept and innovation partnership programmes. Many of the researchers in Irish research institutions involved in food and health research are funded through these programmes.

The Food for Health Ireland initiative mentioned above is one of the most strategic industry led research initiatives in Ireland in recent times in the food and health space was supported and developed by EI, namely the National Functional Foods Research Centre. This Centre is called Food for Health Ireland (FHI) and is the largest single national programme in the food-health space. FHI is an industry led research centre for the development of dairy derived functional ingredients and foods that will bring health benefits for consumers built on excellence in science. It brings together all the key scientists and universities/research institutions in Ireland in the food health space and the top 4 companies in this space as a collaborative centre for food and health. It is one of the largest investments in research made by the state, and although funded by EI, was developed in extensive consultation with DAFM, other agencies (e.g. SFI), industry and academia.

13) How is knowledge intensive research promoted?

Not really sure what is meant by this question. Only excellent science is funded and this is ensured through very robust evaluation processes in place in all funding agencies.

14) How is public/private partnership encouraged?

This is encouraged mainly through the Enterprise Ireland Industry – Innovation Partnership Programme which promotes the development of collaborative research between industry and the research community. See also above in relation to FHI.

Contribution of Ms Modra Murovska from Latvia

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

- Ministry of Education and Science
- Latvian Council of Science
- Ministry of Agriculture
- Food and Veterinary service
- Ministry of Health
- Public Health Agency

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Consultations with stakeholders, questionnaires carried out by non-governmental organizations and National Food Platform

3) What are the coordination mechanisms?

At the time being co-ordination between different actors is not sufficient and coordination mechanisms should be improved

4) How are the national programmes set up and shaped?

State research programmes are developed following the priorities of the research defined by the Council of Ministers. At present we do not have special State programme directed straight to health and food research, but several topics of State research programmes are connected with these issues.

Mainly topics are targeted to the development of new functional foods, investigation of the effect of physiologically active compounds of food on the health, social and economic determinants of nutrition for the prevention of obesity, promotion of food safety through a new integrated foods' risk analysis approach.

5) Why and how are transnational calls implemented?

At present transnational calls directly on food and health topics are not implemented, but there are several bilateral and trilateral research programmes between countries and some of them concern the health and food sector.

Beside these programmes the projects of FP programmes should be mentioned. These projects are targeted to Food safety issues and Latvia's participation in European food information resource network. In the future it is very desirable to take part in the ERA-net projects concerning Health and Food issues. Participation in these projects will ensure the base for further co-operation.

6) How are cross-border research programmes set up and implemented?

At present we do not have thematic cross-border programmes. Bilateral and trilateral research programmes and topics in these programmes are developed bottom-up. Thematic programme for calls are not set up.

7) Is there a (need to) move from coordination to integration and how?

At the time being the main accent in our country is paid on the development of coordination between different stakeholders.

8) How is multidisciplinarity addressed?

Socio-economic aspects in the field of food and health are very important. Collaborative research programme 'Research on medical and socio-demographic relationships of aging in Latvian population' is financed by Latvian Council of Science.

9) What are the cooperation initiatives?

Bilateral, trilateral research programmes, cooperation is realized also via Framework programme projects.

10) How is transfer of technology - From knowledge to business - ensured?

Technology transfer centres established at the Universities and Latvian Technological centre are involved in the transfer of technology.

11) How are Intellectual Property Rights addressed?

In general all Intellectual Property Rights belong to the institution which had financed corresponding investigation.

12) How is innovation supported?

Ministry of Education and Science supports EUREKA, EUROSTARS and market-oriented projects.

13) How is knowledge intensive research promoted?

Due to the economical situation knowledge intensive research is promoted very little or is not promoted at all.

14) How is public/private partnership encouraged?

Latvian Agency for investment and development is involved in the implementation of national programmes on innovation promotion and facilitation of Public Private Partnerships. To ensure Latvia's approach towards European Union average level of welfare, the support is provided to the development of science, innovation and business by encouraging research, development and technology transfer, promoting practical research, encouraging the formation of new enterprises and by facilitating availability of financial resources.

Public and private partnership in Latvia is defined as a co-operation between the public and private sector. Latvian Agency for investment and development is:

- providing consultative assistance in issues that are connected with implementation of PPP projects;
- providing information about existing and emerging PPP projects;
- helping on decision making about the most suitable project finance solutions;
- summarizing and assessing potential PPP resources;
- evaluating terms of PPP projects, tender documents and contacts;
- giving recommendations on adaptation of PPP mechanisms;
- preparing informative brochures;
- elaborating proposals for development of PPP;
- in collaboration with Ministry of Economics elaborating legal base and methodologies;
- developing administrative cooperation with foreign institutions which are responsible for support of PPP projects.

15) Additional information not covered above

The number of the State Research programmes is reduced from 9 during 2006-2009 to 5 during 2010-2013. There is only partial continuation of successfully carried out State Research program 'Innovative technologies for high-quality, safe and healthy food production from genetically, physiologically and biochemically diverse plant and animal material' (2006-2009) in the State Research program 'Investigation and sustainable use of local resources (mineral deposits of the earth, technologies for the acquirement of forest resources, technologies for the food production, transportation)' (2010-2013). Unfortunately integrated research of food and health at the present is not among the priorities. Therefore doubtful is also the participation of Latvia in Joint Programming.

Contribution of Mr Øystein W. Rønning from Norway

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

- Ministries: Health, Education and Research, Agriculture and Food, Fisheries and Costal Affairs, and Trade and Industry.
- Agencies, etc. The Research Council of Norway (RCN), Innovation Norway
- Societies, etc: Norwegian Cancer Society, Norwegian society for heart and lung diseases.

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

- Governmental papers (green and white papers)
- Focus of various research programmes of RCN and private societies.
- Focus of governmental
- Expert groups from research communities.
- Newly established National Technology Platform 'Food for life'.

3) What are the coordination mechanisms?

Coordination between funders in the agricultural sector is well coordinated through RCN. This is done by discussions prior to the calls each year.

4) How are the national programmes set up and shaped?

The main national programme is the Food Programme. This programme is funded by several ministries (the main ones are Agriculture and Food, Fisheries and Costal Affairs, and Trade and Industry.). The new food research programme (The Food Programme: Norwegian Food from Sea and Land) is based on the view that food is essential to our health and quality of life. The programme will focus on innovation throughout the value chain from consumer to primary production for both agricultural food products and seafood.

The vision of the programme is ***Competitive and innovative industries that supply Norwegian food for the future.***

The primary target groups of the programme are *trade and industry* and *public administration*, whereas the *R&D communities* are very important for the performance of the research tasks that trade and industry and the public administration need.

- **Trade and industry** include primary producers (farmers and fishermen), trade and industry organisations, enterprises and farms in agriculture and fisheries, the food industry and the supplier industry for this sector.

- **The public administration** includes the Norwegian Food Safety Authority and the 'food ministries'. The Scientific Committee for Food Safety will also be an important user of research-based knowledge.

- **The R&D communities** are to ensure that Norway has relevant scientific knowledge, expertise and capacity in relation to national requirements and at international level. The universities have an important task of ensuring optimal recruitment of researchers qualitatively and quantitatively as well as in relevant fields.

The research priorities are:

- Market Research
- Innovative and Market-adjusted Products and Entrepreneurship
- Production Technology, Process Technology and Logistics
- Competitive Production of Raw Materials
- Food-Related Health Quality and Quality of Life
- Innovation in the Public Sector/Food Administration

5) Why and how are transnational calls implemented?

Transnational calls are mainly implementer through ERA-nets. Some transnational calls are implemented in the Nordic region only, as 'Norianets'.

6) How are cross-border research programmes set up and implemented?

There are not any significant cross-border research programmes.

7) Is there a (need to) move from coordination to integration and how?

In some areas there is certainly a need for integration of research programmes.

8) How is multidisciplinarity addressed?

Multidisciplinarity is usually addressed in so called 'large scale research programmes' that lasts for > 5 years.

9) What are the cooperation initiatives?

10) How is transfer of technology - From knowledge to business - ensured?

A specific program called 'FORNY' takes care of this matter. The program funds infrastructure related to running TTOs at the universities and projects for verification of ideas (proof of concept).

11) How are Intellectual Property Rights addressed?

The legislature in this area has been upgraded recently. The principle is that the IPR belongs to the institution where the results were generated. Partners in a consortium have the freedom to negotiate the exploitation of the results.

12) How is innovation supported?

Innovation is supported in own research and innovation programs where businesses and other users of the results should participate and contribute financially.

13) How is knowledge intensive research promoted?

14) How is public/private partnership encouraged?

'Competence building projects' are public/private partnerships in the sense that private companies contribute in funding research projects at universities and other research institutions.

Contribution of Mr Peter Raspor from Slovenia

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Name of funder	Type of organisation	Main areas
Ministry of high education science and technology	Government	Underpinning research and development in all sciences. Via ARRS and TIA
Ministry of agriculture forestry and food, Department for Food, Environment and Rural Affairs	Government	Sustainability and security of food production and supply
Ministry of Environment, Department for Biotechnology	Government	Sustainability and GMO
Ministry of Health General Directorate of public health	Government	Public health prevention and promotion, prevention of diseases
ARRS	Agency	Underpinning research in all sciences. Supports research centres and research on food and health.
TIA (Technological innovation agency)	Agency	Encouraging development and use of technology to promote competitiveness.
Slovenian Accreditation Agency	Government Department	Food Standards

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Various. High-level priorities are set with reference to government policies and priorities (health, food; general policies for science and innovation). These are translated into more detailed programmes by the different organisations with reference to their specific mandates.

For example,

Ministry of Health: Resolution on the national programme of food and nutrition policy 2005-2010, (Published in the OG RS, No. 39/2005, 19.4.2005), National Health Enhancing Physical Activity Programme 2007 – 2012 focuses on science it can apply to underpinning, informing and evaluating its objectives for safer food and healthy eating; where as the research councils have mandates focused on underpinning the excellence of the science base (capacities and people), albeit oriented to identified priority areas.

TIA -TIA is an independent public agency responsible for the enhancement of technology development and innovation in the Republic of Slovenia. Our

main activities are grant programs aimed at technology development and foster cooperation of R&D institutions and universities with industry. Identifications of needs is occasionally done by means of calls for proposals, which are general and not focused on specific research area.

Needs are identified through different mechanisms calls for tenders, public orders, discussion on national TP organised Chamber of commerce. Special sessions on Slovenian society of Nutrition and during ad hoc meeting organised by Ministry of Agriculture.

3) What are the coordination mechanisms?

As regards co-ordination between programme funders and directors – various mechanisms exist. Some important examples are:

Food Issues

A high-level coordination between Ministry of health, ministry of science and technology and ministry of agriculture, forestry and food is Council for Foodstuff established within national Food law dealing with analysis of policy challenges across the food area and recommendations for action like: Resolution on the national programme of food and nutrition policy 2005-2010, which was followed by action plan prepared by Ministry of Health (Food and Nutrition Action Plan for Slovenia 2005-2010).

- To develop a Joint Research Strategy to improve co-ordination of departmental research and development on safe, low-impact foods and a healthy diet.

An example of cross-government working based on detailed analysis and consultation to generate a consensus on key issues and challenges. i.e.:

Cross-government obesity research and surveillance plan

4) How are the national programmes set up and shaped?

By the responsible organisation(s), in consultation with other funders and stakeholders, as needed. A very wide range of mechanisms exists. Generally there will be some form of oversight or input from independent experts, and usually also end users and other stakeholders, in steering and reviewing the direction of programmes.

5) Why and how are transnational calls implemented?

This is a very open issue. In general terms international calls are implemented when there is seen to be added value from such an approach. For example where the issues at hand can be addressed better though access to expertise and capacities – individually or in combination not available at national level, or by carrying out work on a scale or level of resource not possible at national level. In this respect we support bilateral multilateral and regional research and development contacts.

My impression is that the Slovenia is very positive about international collaboration. Individual organisations approaches state their own priorities and remits.

Most research calls are based on open competition.

6) How are cross-border research programmes set up and implemented?

A wide variety of approaches is used from support to EU-wide activities such as ERANETs, co-funding or other support to FP projects, support to international facilities and programmes, ad hoc bi- and multi-lateral arrangements between funders.

7) Is there a (need to) move from coordination to integration and how?

What is needed, and recognised to different degrees in different organisations' approaches, is to look at the science that is needed, and then determine the best way to deliver this. This can be achieved individually or through collaboration at national and international level. When this is clear then we can take a look at the possible mechanisms for each case.

8) What are the cooperation initiatives?

The main incentive to co-operate is the chance to win funding. There are some funding streams that support networking of researchers with counterparts in other countries, as a stimulus to developing joint proposals and projects. However there are some initiatives to transfer knowledge and skills as well. Ie. Call for centre of excellence is the case where all the knowledge sources were mobilised not just in the narrow meaning of food, but also food, technology, nutrition – in very broad context.

There clearly is a need to move from coordination to integration. Political decision based on relevant data has to be made about priority topics on national level. It has to be determined what goals are to be achieved. Targeted approach towards these goals needs to be employed.

In public calls cooperation is encouraged with two basic approaches:

- Cooperation between companies and universities is obligatory
- Cooperation is not obligatory, but more points are awarded to projects, which include such cooperation

9) How is multidisciplinarity addressed?

Programmes often start by framing the question to be addressed rather than from a specific discipline or sector and input from relevant disciplines will be part of this. The opportunities will then be promoted to the relevant potential participants. If we take a look to CRP(focused research programme) this is the case which works well for Slovenian circumstances.

In case of technology development, multidisciplinarity is addressed through the needs of the leading company in developing new product or technology. One company usually doesn't possess all the knowledge needed to deliver the final product, thus it has to find and include others (companies, universities...) into development activities.

10) How is transfer of technology - From knowledge to business - ensured?

It is not ensured, partially is stimulated by TP food for life, partially by the best groups but not as well stimulated by ministry of economics. Lately they are attempts from TIA- technological innovation agency.

Transfer of technology is ensured by encouraging cooperation as described in previous answer. There is also a special program 'Young researchers for Economy'. In this program PhD students are employed by the company, but they carry out basic research, according to companies' needs, mainly in cooperation with institutions of knowledge.

11) How are Intellectual Property Rights addressed?

In principle IPR issues between project partners need to be solved and agreed on in consortium agreement. Projects leading to more innovations and patents are awarded with more points in evaluation process.

Depends on researchers - the groups which are close to the research done for pharma are much more educated on that. Food or nutrition groups which do not have this experience are really handicapped.

12) How is innovation supported?

Companies which clearly demonstrate existence of systematic approach towards fostering innovation are awarded with more points in evaluation process. Also the number of registered innovations and patents is a criterion.

13) How is knowledge intensive research promoted?

In most calls one of the conditions for projects that are applying for public financing is that the final result is in form of new product, technology, service... Research activities leading to development of new product are usually connected with incorporation of all the knowledge in the company as well as with knowledge from outer sources. However, in most cases more application oriented than basic knowledge is needed, which gives an impression of less knowledge intensive research.

14) How is public/private partnership encouraged?

In case of co-financing research in companies we cannot talk of real public/private partnership examples. Although all the projects are partly financed by companies, this is due to state aid regulations. My personal opinion is, that there is room for PPP also in research e.g. building research facilities for young innovative companies, but due to current economic situation companies mostly are not in favour of this kind of initiatives.

With national calls the partnership is encouraged since the once showing partnership can get more money from public side (i.e..: ARRS calls).

15) Additional information not covered above

16) Additional Comments

As noted above, there is a significant amount of co-ordinated work across the Slovenia government on policy and research relevant to food, including diet and health, in response to needs. However it was never systematic and permanent analysis of strengths, weaknesses and opportunities across the foods research landscape in the Slovenia.

Contribution of Dr Lena Strålsjö and Dr Johanna Dernfalk from Sweden

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Name of funder	Type of organisation	Main areas
Ministry for Rural Affairs	Government Department	
Ministry of Health and Social Affairs	Government Department	
Ministry for Enterprises	Government Department	
The National Board of Agriculture (Jordbruksverket)	Government Authority, Rural Affairs	Food safety, animal health
National Food Administration (Livsmedelsverket)	Governmental Authority, Rural Affairs	Food safety, healthy eating
The National Veterinary Institute (SVA)	Governmental Authority, Rural Affairs	Food safety, risk assessments
Swedish National Institute of Public Health (Folkhälsoinstitutet)	Governmental Authority, Health and Social Affairs	Public health promotion, treatment of disease
The Swedish Research Council (Vetenskapsrådet)	Research Council	Funding, mainly basic, research within all academic areas
The Swedish Research Council of Environment, Agricultural Sciences and Spatial Planning (Formas)	Research Council	Research within the areas of environment, agriculture (including food) and spatial planning
The Swedish Governmental Agency for Innovation Systems (Vinnova)	Research Council	Funding innovations and implementation of research
The Swedish Food Federation (Livsmedelsföretagen)	Professional and industrial organisation	Food production, nutritionFood safety, animal health
The Swedish Retail and Wholesale Development	Professional and Industrial organisation	Marketing and retailing – including food

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

It works in several different ways. The government supplies the governmental authorities with a bill of tasks to be performed within different areas of responsibility each year – actions of larger dimension, i.e. policies, strategy plans etc. The research councils and other authorities can make up their own detailed programmes, within there areas of responsibility and also, bottom-up research (where the scientists at universities and other research authorities apply money for their own ideas), is welcome. The governmental bills and different research programmes are usually set up in close conversation

with stakeholders and users in society. It is becoming more and more important that all research that is funded should be 'useful for society'.

3) What are the coordination mechanisms?

There are no fixed coordination mechanisms, often one funding body receives a bill from the government to set up a programme within a special area, sometimes with the aim to do it in close discussion with other authorities. Sometimes the funding bodies, after evaluation or analysis of certain areas make the decision to set up strategic research programmes themselves. One example is the Swedish cross-disciplinary food research programme 'Tvar-Livs' that is a jointly financed research programme between the state and the business world. It comprises a maximum of SEK 200 million (20 million Euro) during 2010-2014. Stakeholders involved in the Swedish technology platform 'Food for Life' and the platform's strategic research agenda are the originators of the programme in which VINNOVA, Formas, the Swedish Food Federation (Li), the Swedish Farmers Foundation for Agricultural Research and the union Svensk Dagligvaruhandel are jointly collaborating. It is based on 50% co-funding from the business world.

4) How are the national programmes set up and shaped?

National programmes are usually initiated by the government – and subcontracted to one or several of the governmental authorities. The responsible organisations consult with other funders and stakeholders, as needed.

5) Why and how are transnational calls implemented?

Sweden has many cooperation programmes with the Scandinavian countries, for instance through NordForsk and NKJ (Nordic Organ for Agriculture) and are also involved in several ERA-nets and ERA-net calls. Involvement in transnational calls is usually determined after discussions and prioritisation on both governmental level and among governmental authorities. To be involved in a transnational call, it has to give hope of adding something more to the Swedish research society than a national call would do.

In all transnational calls, Sweden funds Swedish researchers and research activities. Joint programming with a common pot of money has not yet been implemented in any programmes.

6) How are cross-border research programmes set up and implemented?

See 5). It depends on the type of cooperation and partners involved. Sometimes only networking activities are financed, sometimes it is presentation of research results and most often it is research activities.

7) Is there a (need to) move from coordination to integration and how?

At the moment I don't think there is movement from coordination to integration. I haven't heard any discussions about needs for it, but I think the Swedish government is open for discussions about it, it might be a decision that should be made from case to case.

8) What are the cooperation initiatives?

Sweden is involved both nationally (with other funding organisations), and internationally (Scandinavia, Europe, globally) in different initiatives. An example is the Nordic Centres of Excellence for Food, financed by the Scandinavian countries through NordForsk.

9) How is multidisciplinarity addressed?

Multidisciplinary research projects are regarded very positive and several governmental financing bodies are at the moment changing their evaluation systems to better suit cross-disciplinary projects. It is also becoming more and more frequent that different governmental funding bodies act together and set up multidisciplinary research programmes.

10) How is transfer of technology - From knowledge to business - ensured?

Very dependent on the programme, in many cases already in the application it is asked for a strategy by the research team on transfer of technology. In other cases cooperation between academic institutions and companies might be requested for funding. See also point 5, food research programme 'TvarLivs'.

11) How are Intellectual Property Rights addressed?

The intellectual property always belongs to the researcher.

12) How is innovation supported?

The Swedish Governmental Agency for Innovation Systems (Vinnova) has the major responsibility for funding of innovation programmes. Other research funding bodies often cooperate with Vinnova.

13) How is knowledge intensive research promoted?

14) How is public/private partnership encouraged?

Partnership between academic institutions and industry is usually promoted and looked positive upon.

15) Additional information not covered above

I know that different universities in Sweden set up common programmes and research schools for PhD-students independent of governmental initiatives. Those initiatives are usually funded by the universities.

Contribution of Dr Andreas Aeschlimann and Dr Barbara Walther from Switzerland

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Ministries (Health, agriculture, veterinary affairs), agencies, cantons, political power groups, universities and colleges, advisory organisations (EU-Research: http://www.euresearch.ch).

Ministries are also doing their own research (Ressortforschung).

The Confederation's Innovation Promotion Agency (CTI) and the Swiss National Science Foundation (SNF) are the two most important funders for applied - and basic research, respectively - the later institution is since 1952 under private law to promote independent scientific research.

Private funding - in the Food sector from ETH and Swiss Farmers Association Foundations; in the Health sector from e.g. Novartis and Roche Foundations.

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Consultation of expert groups, council and stakeholder panel consultations. Make reference to research master plans, strategic research agendas of national and/or international platforms. Immediate situational needs in the Ressortforschung where so called 'associated expert groups' and expert fora play a crucial role.

In Switzerland there is a very broad range from the almost no more existing 'conventional, classical' production over the 'integrated' production to the 'biological, organic' production. Thus identifying and setting priorities for e.g. either functional food research versus organic food production is driven by many different public and private stakeholders and stakeholder groups.

Also, the economic impact of food versus health (medical) research is weighed at different scales by different people and money flows generally spoken easier into health (medical) programmes than into food research. In general, historically given, the people of the two sectors don't know each other.

In Switzerland, the Ressortforschung (above) helped to maintain independent agricultural and food research with a yearly budget of approx. 145 million CHF over the last 5 years. Identification and setting of priorities is done by Agroscope, which is run under New Public Management and equipped with Global Budgets and Performance Contracts over 4 years since 2000, and once the budget is spoken by the Parliament, steered and accompanied at three levels: at Agroscope level with an 'Agricultural Research Council' on a strategic level, at the level of each one of the three Research Stations with a 'Associated Expert Group' also mainly giving support on a strategic level, and at Product's (Research Unit's) level with Expert Fora, which help identify and set research priorities on a operational level, indeed. This is on this comparatively low hierarchical level where top-down and bottom-up needs meet and get set and realised.

3) What are the coordination mechanisms?

Panel evaluations. Networking and call procedures.

4) How are the national programmes set up and shaped?

Call procedures, accompanied by scientific panels, collaboration in consortiums (Swiss National Science Foundation: http://www.snf.ch/E/targetedresearch/researchprogrammes/newNRP/Pages/_xc_nrp69.aspx, Swiss Food Research http://www.swissfoodnet.ch/food-research-switzerland/welcome.html)

5) Why and how are transnational calls implemented?

Why: to improve the chances of a project to be accepted

How: e.g. via Ministry after governmental signature of an action plan? (e.g. COST, Era-Net), following international call procedures.

Switzerland supports and participates at several cross-border, transnational and interregional co-operation programmes of the EU-INTERREG IV Programme. From time to time there are calls allowing food and health research proposals. An example of such call is the transnational call between Italy and Switzerland (INTERREG IIIA ProAlp). Similar to COST-projects, usually each country founds its own participants, so no common pot is established.

6) How are cross-border research programmes set up and implemented?

See 5), consortium agreements, bilateral agreements

In 2007 the Research Programme Nutriscope was launched by Agroscope. Before there were Joint Programmes such as Antibiotic Resistance and 'Endocrine Disruptors: Relevance to Humans, Animals and Ecosystems' launched by the SNF and remunerated with 12 and 15 million CHF, respectively. Currently running is 'Benefits and Risks the Deliberate Release of Genetically Modified Plants' remunerated by the SNF with 12 million CHF.

7) Is there a (need to) move from coordination to integration and how?

There is a need to move from coordination to integration; although national borders and funding sources must be respected, the challenges of prevention instead of therapy cannot be afforded by single countries.

8) What are the cooperation initiatives?

Common events to exchange information about research projects, knowledge exchange, interdisciplinary activities.

9) How is multidisciplinarity addressed?

Long term and constant networking between disciplines. Depending on the type of the problem to be addressed and on the priorities of the funding body.

Transdisciplinarity a must in the Ressortforschung (above). Working 'along the Total Food Chain' or 'elaborate a holistic view of e.g. a process or product' is best practice. An obstacle: Collaborations get more complex and organizing and writing good, clear syntheses of multidisciplinary programmes is definitely a big challenge.

10) How is transfer of technology - From knowledge to business - ensured?

Publication in industry oriented journals, presentations at conferences, collaborative initiatives and projects between research institutions and industry/SME
(CTI http://www.bbt.admin.ch/kti/index.html?lang=en)

Obstacles: There is an increasing risk of potential patent infringements, especially for SMEs.

Too many research and industrial partners involved in competitive (not pre-competitive) research. Best practise: Close collaboration of public research with industrial R&D and production units on very specific projects.

11) How are Intellectual Property Rights addressed?

With contracts, according to the legal circumstances of the institution (public sector interests must be assured).

Obstacles: 'Novelty' and 'Inventive Step' often hard to prove

Best practise: Collaboration Agreements and Research Contracts for mandated research must be clear and fair on this.

12) How is innovation supported?

By increasing third money project initiatives, developing research for solving specific practical problems, providing excellent infrastructures and creating the necessary environments for successful partnerships.

Obstacles: E.g. rigorous guidelines on AOC (Appelation d'origine contrôlée) which may prevent technology innovation; or fears (justified or not) of consumers for e.g. GMO applications

Best practise:

To support a sustainable production and processing of healthy and safe products

To elaborate the basics for guidelines (legislation: National, EU; Codex) to allow safe products with not misleading health claims and at affordable cost.

13) How is knowledge intensive research promoted?

Giving access to on-line databases, assuring critical mass of research groups, research in networks.

14) How is public/private partnership encouraged?

Impact-orientations supported by government frameworks. Best example: Swiss Food Research supported by CTI.

15) Additional information not covered above

In 2010 Switzerland contributed about a total of CHF567 million to International Research (FP7, ESA, CERN, Research Infrastructures, Bilateral Scientific Collaborations, COST, EMB, etc.) The slices available for Food and Health Research were presumably very little.

Contribution of Prof. Vural Gökmen from Turkey

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Mainly state departments are involved in Turkey. These are:

Name of funder	Type of organisation	Main areas
Ministry of Agriculture and Rural Affairs	Government Department	Food safety, inspection, sustainability and security of food production and supply
Ministry of Health	Government Department	Public health promotion, treatment of disease
Technological and Scientific Research Council	Government Department	Funds research projects in many fields including food and health area
State Planning Organization	Government Department	

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Private companies are aware of the changing competition situation in the market. These companies rarely ask to universities to collaborative in specific projects related to food and health including low sugar, low fat, high fiber food products, but there is no clear mechanism to determine the needs.

3) What are the coordination mechanisms?

Turkish Parliament recently agreed to set new ministry named Ministry of Food which will specifically deal with nation-wide food related issues.

4) How are the national programmes set up and shaped?

5) Why and how are transnational calls implemented?

The Scientific and Technological Research Council have some bilateral agreements to support broad thematic fields and focussed research topics. Current directorate of the council is very positive to enlarge the bilateral network, and the number of agreements have been increasing very fast.

6) How are cross-border research programmes set up and implemented?

See 5.

7) Is there a (need to) move from coordination to integration and how?

To move from coordination to integration will, for sure, increase the process efficiency. In Turkey, there are a lot of fragmented efforts related to food and health issues from food science, chemistry, biology, agriculture, medicine, pharmacy fields, etc. There are now some initiatives to integrate these fragmented efforts by means of building some kind of platforms to share new ideas and background, combine efforts, develop short- and long-term strategies.

8) How is multi-disciplinarity addressed?

Coming back to Q7, new platforms and centres are trying to get together from different disciplines including food science, chemistry, medicine, pharmacy, etc.

9) What are the cooperation initiatives?

See 7.

10) How is transfer of technology - From knowledge to business - ensured?

Some leading universities in Turkey such as Hacettepe University have established technology transfer offices to enable an effective transfer of knowledge from university to industry.

11) How are Intellectual Property Rights addressed?

Intellectual Property Rights are taken under control by a contract between the collaborators of the project. Such a contract is mandatory for funding bodies like The Scientific and Technological Research Council of Turkey.

12) How is innovation supported?

The Scientific and Technological Research Council funds innovation-based research projects. The Ministry of Industry and Trade also supports innovation based research projects called SAN-TEZ. The SAN-TEZ programme is for graduate students carrying out their PhD theses in universities. If a PhD thesis is dealing with possible solutions strategies of a particular industrial problem, then the ministry give priority those projects for funding. Industrial involvement is mandatory in SAN-TEZ projects.

13) How is knowledge intensive research promoted?

Leading state universities in Turkey have established Techno Parks where they support private companies for their research and development activities in collaboration with the scientists from universities. The Turkish government offers several financial advantages to these companies. A lot of companies mainly small and medium size enterprises are actively involved in research activities in the Techno Park regions of state universities. The need for a company to enter the Techno Park region is to submit a research project to be evaluated by the experts from university. If the project meets the state-of-art criteria, then it is approved and the company starts to take the benefits of being part in the Techno Park.

14) How is public/private partnership encouraged?

In almost every research funding body, public/private partnership gives a positive mark during the evaluation of research projects.

Contribution of Dr Patrick Miller from the United Kingdom

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Many organisations are involved. The main ones in terms of funding and direction of programmes are:

Name of funder	Type of organisation	Main areas
Food Standards Agency	Government Department	Food safety (all of UK), healthy eating (Scotland and Northern Ireland)
Department for Environment, Food and Rural Affairs (Defra)	Government Department	Sustainability and security of food production and supply
Department of Health	Government Department	Public health promotion, treatment of disease, healthy eating (England)
Rural and Environment Research and Analysis Directorate of the Scottish Government	Government Department	Sustainability and security of food production and supply, with a focus in Scotland
Department for International Development (DFID)	Government Department	International development and aid, working to get rid of extreme poverty
Welsh Government	Government	Food and health (and other) policy for Wales
Biotechnology and Biological Sciences Research Council	Research Council	Underpinning biotech and biological sciences. Supports research centres and research, training and associated activities in areas including food and health
Medical Research Council	Research Council	Underpinning medical sciences and therapies. Funds research centres and commissions some research on diet and health
Economic and Social Research Council	Research Council	Economic and social research including some work relevant to food
Engineering and Physical Sciences Research Council	Research Council	Underpinning engineering and physical sciences, including work relevant to food + drink sector
Technology Strategy Board	Agency	Supports business-led innovation with a focus on technology
Wellcome Trust	Non-profit (charitable trust)	Funds research centres and projects in the health areas, some work relevant to food
Cancer Research UK	Non-profit (charity)	Research, information and campaigns to reduce cancer deaths

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Various. High-level priorities are set with reference to government policies and priorities (health, food; general policies for science and innovation). These are translated into more detailed programmes by the different organisations with reference to their specific mandates. For example, the FSA focuses on science it can apply to underpinning, informing and evaluating its objectives for safer food; where as the research councils have mandates focused on underpinning the excellence of the science base (capacities and people), albeit oriented to identified priority areas.

Needs are identified through different mechanisms. Generally there will be a wide consultation with stakeholders, with expert input and peer review to develop the detailed scientific content of programmes. There is a general trend to increasing focus on big science, policy and societal challenges and areas that are seen as having potential to benefit the UK economy.

3) What are the coordination mechanisms?

As regards co-ordination between programme funders and directors – various mechanisms exist. Some important examples are:

Food Matters
A high-level report by the UK Cabinet Office published in July 2008, gave a detailed analysis of policy challenges across the food area and recommendations for action, including two key recommendations relate to co-ordinating science that are now being implemented:

- To develop a Joint Research Strategy to improve co-ordination of departmental research and development on safe, low-impact foods and a healthy diet.

- To set up a Food Strategy Task Force to co-ordinate departments' work + ensure delivery of all actions agreed in the report.

An example of cross-government working based on detailed analysis and consultation to generate a consensus on key issues and challenges, endorsed at Prime Ministerial level.

This has led to two important publications:

Food 2030 set out a cross-Government vision for a safe, nutritious, sustainable and secure food system:
http://archive.defra.gov.uk/foodfarm/food/pdf/food2030strategy.pdf

The **UK Cross-Government Food Research and Innovation Strategy** set out a common framework for how research and innovation will contribute to this: http://www.bis.gov.uk/assets/bispartners/goscience/docs/c/cross-government-food-research-strategy

Global Food Security programme

The UK's main public funders of food-related research and training are working together through the Global Food Security programme. The programme aims to help meet the challenge of providing the world's growing population with a sustainable and secure supply of safe, nutritious and affordable high quality food. That food will need to be produced and supplied from less land and with lower inputs, and in the context of global climate change, other environmental changes and declining resources. The programme will take interdisciplinary and whole systems approaches to research on UK and global food supply systems, from both a consumer and producer perspective. The scope of the programme includes: food production and resource management; food economics, markets and trade; food processing, manufacture and distribution systems; food safety and nutrition; consumption habits and practices; and waste in the food system.

The programme will coordinate research supported by the programme partners across Government departments, the devolved administrations, Research Councils and the Technology Strategy Board. It will build on the partners' existing activities, aiming to add value to their current and future investments, and complementing rather than replacing their individual strategies. It will bring additional coherence by acting as a focus for joint activities and helping to ensure alignment of individual activities with shared goals.

The programme comprises four cross-disciplinary themes based on those set out in the *UK Cross-Government Food Research and Innovation Strategy*:

1) *Economic resilience* – securing a better understanding of how poor economic resilience leads to hunger, poverty and environmental degradation across the globe and how this might be addressed

2) *Resource efficiency* – including water, energy, nutrients and other inputs; land use and soils, with particular focus on the sustainable use of resources; increasing competitiveness, profitability, efficiency and reducing waste

3) *Sustainable food production and supply* – including farming systems, food production from crops and animals (including fish), food processing, manufacture and transport

4) *Sustainable, healthy, safe diets* – including food safety throughout the supply chain, nutrition, consumer behaviour, food choice and accessibility.

http://www.foodsecurity.ac.uk/

Joint working by Chief Scientists
All science-funding Departments have a Chief Scientific Adviser (CSA) who provides independent challenge and assurance on Departments' use of science. They are led by the UK Government Chief Scientific Advisor, Professor Sir John Beddington, who provides a corresponding role for government as a whole. The CSAs meet regularly and work together as the CSA Committee (CSAC) to ensure the science is in place to address key policy challenges. For example, CSA core issues groups co-ordinate work on current key challenges including climate change and food security; CSAC is also developing cross-cutting R&D priorities to inform planning of future work on big issues.

Funders groups
A number of joint funders groups operate in specific areas – for example TSEs, nutrition, nanotechnologies, microbiological safety, ageing). Roles vary but in general they share, map and analyse information on different funders' activities in related areas, and in some cases to develop co-ordinated approach to future priorities and joint calls.

National Prevention Research Initiative (NPRI)
The National Prevention Research Initiative (NPRI) is a UK initiative made up of government departments, research councils and major medical charities that are working together to encourage and support research into chronic disease prevention. Its core aim is to develop and implement successful, cost-effective interventions that reduce people's risk of developing major diseases by influencing their health behaviours.

The NPRI was founded in 2004 when the National Cancer Research Institute brought the consortium together. An initial budget of over £11 million funded Phase 1 and 2. Phase 3, announced in June 2008, will be supported by a further commitment of up to £12 million over five years. The Medical Research Council manages the Initiative on behalf of its 16 Funding Partners.

Further information at:
http://www.mrc.ac.uk/Ourresearch/Resourceservices/NPRI/index.htm

RCUK and cross-council initiatives
The UK Research Councils co-ordinate their work through RCUK. This includes several cross-council initiatives including one on Ageing: lifelong health and wellbeing. RCUK has also published an international strategy.

Further details at:

http://www.rcuk.ac.uk/default.htm

4) How are the national programmes set up and shaped?

By the responsible organisation(s), in consultation with other funders and stakeholders, as needed. A very wide range of mechanisms exists. Generally there will be some form of oversight or input from independent experts, and usually also end users and other stakeholders, in steering and reviewing the direction of programmes.

5) Why and how are transnational calls implemented?

This is a very open question. In general terms international calls are implemented when there is seen to be added value from such an approach. For example where the issues at hand can be addressed better though access to expertise and capacities – individually or in combination not available at national level, or by carrying out work on a scale or level of resource not possible at national level.

My impression is that the UK is positive about international collaboration. Individual organisations approaches will reflect their own priorities and remits.

Most research calls are based on open competition and some organisations calls are open to participants outside the UK – for example the FSA and DFID.

6) How are cross-border research programmes set up and implemented?

See 5. A wide variety of approaches is used from support to EU-wide activities such as ERANETs, co-funding or other support to FP projects, support to international facilities and programmes, ad hoc bi- and multi-lateral arrangements between funders.

The UK is engaged in the JPIs initiated to date that are relevant to the food and health area.

7) Is there a (need to) move from coordination to integration and how?

The major challenge is probably seen as co-ordination, both within the UK and internationally. Integration is one way to do this, which needs to be considered, with other approaches, on a case-by-case basis. What is needed, and recognised to different degrees in different organisations' approaches, is to look at the science that is needed, and then determine the best way to deliver this - whether individually or through collaboration and national and international level - and then to look at the possible mechanisms in each case. JPIs can be a useful first step in some areas.

8) How is multi-disciplinarity addressed?

Programmes often start by framing the question to be addressed rather than from a specific discipline or sector and input from relevant disciplines will be part of this. The opportunities will then be promoted to the relevant potential participants.

The more basic or fundamental research funded primarily by the Research Councils in the UK is split to some extent by broad disciplines, but the Councils work together in joint programmes, calls and other co-ordination mechanisms to address issues where a mixture of disciplines is needed.

9) What are the cooperation initiatives?

The main incentive to co-operate is the chance to win funding. There are some funding streams that support networking of researchers with counterparts in other countries, as a stimulus to developing joint proposals and projects.

10) How is transfer of technology - From knowledge to business - ensured?

By encouraging academic-business collaborations through networking events and through funding. The UK's KTNs run networking events for a mixed audience and the Technology Strategy Board targets funding at technology readiness levels that sit across the academic-business overlap.

11) How are Intellectual Property Rights addressed?

For collaborative projects funded by the TSB, the partners must have signed an agreement prior to funding. The TSB also provides funding for awarded projects to address IPR.

12) How is innovation supported?

Through the UK's innovation agency, the Technology Strategy Board, by co-funding business-led projects and encouraging knowledge exchange. In addition, Government Departments and Devolved Administrations have their own mechanisms, including policy levers such as financial incentives e.g. R&D tax credits, procurement, standards and regulation.

13) How is knowledge intensive research promoted?

14) How is public/private partnership encouraged?

Questions 10 to 14 are very broad questions and the answers will vary according to the specific circumstances. An overall approach to innovation is

set out in the 'Blueprint for Technology' published in 2010 by the Department for Business, Innovation and Skills.

http://www.bis.gov.uk/policies/innovation

Getting knowledge of technology into to business is important but in the UK knowledge transfer is seen as much broader than this, particularly in the food and health area. It covers transfer and use of knowledge by consumers, manufacturers, policy makers and scientists. Its impact is also much wider - on individual, societal and organisational behaviour, health, sustainability and policy as well as on competitiveness.

Some relevant examples of public-private partnerships include:

Innovation Platform on Sustainable Agriculture and Food
Innovation platforms focus on specific societal challenges where the UK Government is taking action through policy, regulation, procurement or fiscal measures to tackle the problem. By improving co-ordination between the key players from industry, academia and government, innovation platforms can identify barriers to meeting the challenge, map possible routes to overcoming the barriers and align activities to support innovative solutions. Innovation platforms aim to fundamentally change the ability of UK businesses to provide solutions for the global marketplace, boost UK economic performance, and provide higher quality of public services.

The Sustainable Agriculture and Food Innovation Platform will see investment of up to £75 million over the next five years in innovative technological research and development in areas such as crop productivity, sustainable livestock production, waste reduction and management, and greenhouse gas reduction. It will focus on four interlinked areas:

- Crop productivity including protection and nutrition
- Sustainable livestock production
- Waste reduction and management
- GHG Reduction Technologies and Methodologies

http://www.innovateuk.org/ourstrategy/innovationplatforms/sustainableagricultureandfood.ashx

The Technology Strategy Board's Biosciences strategy was published in 2009 with three priority areas: genomics, industrial biotechnology and agrifood. It has committed nearly £30m in biosciences-inspired projects, matched by business, including a £6.25m competition for healthier and safer food.

LINK

LINK was a means by which the UK Government encouraged collaborative research for innovative and industrially-relevant research to support its wealth creation and quality of life goals. In the food area, Defra (see 1 above) provided grants for approximately £5 million of research per year to various consortia in five Farming and Food Science LINK programmes. Through LINK, Defra provided grants to consortia of the private sector and the research base to conduct research for industrial or private sector purposes aligned to Defra objectives. In 2010 the food-related LINK programme was superseded by the Innovation Platform described above.

Further information: http://defrafarmingandfoodscience.csl.gov.uk/linkprogrammeoverview.cfm

Diet and Health Research Industry Club (DRINC)

This is an example of a Research Council-private partnership. DRINC is a £10M, 5-year partnership between BBSRC (see 1 above) and a consortium of leading companies, aimed at helping the food industry develop products that deliver enhanced health benefits for consumers. Its themes are:

- Improved understanding of healthier diets - includes effect of food components on energy intake, and how foods might be designed to have precise nutritional properties
- Bioactives in foods - includes understanding of how beneficial compounds work and how health claims may be verified

Further information at:
http://www.bbsrc.ac.uk/business/collaborative-research/industry-clubs/drinc/drinc-index.aspx

Knowledge Transfer Networks (KTNs)

Each KTN is a group of individuals that have a shared interest in an area of emerging technology. KTNs provide an easy means of acquiring and sharing knowledge, and hence, participating in shaping the future of a strategically important technology in the UK. KTNs have been set up and are funded by government, industry and academia. They bring together diverse organisations and provide activities and initiatives that promote the exchange of knowledge and the stimulation of innovation in these communities. There are currently 25 KTNs (including on Food Processing (Biosciences KTN) and on Health Technologies) with a total membership of around 45,000.

Further information:

http://www.innovateuk.org/deliveringinnovation/knowledgetransfernetworks.ashx

The BBSRC is active in many of these areas – further information at:
http://www.bbsrc.ac.uk/business/business-index.aspx

15) Additional information not covered above

Additional thought could be given to how to support SMEs in producing a strong regulatory package for EFSA approval.

16) Additional Comments

As noted above, there is a significant amount of co-ordinated work across the UK government on policy and research relevant to food, including diet and health. This includes the development of a joint Food Research Strategy and other elements which are likely to be of interest to the Expert Group. These include an analysis of strengths, weaknesses and opportunities across the foods research landscape in the UK.

Contribution of Ms Chiara Tonelli from Italy

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Ministries, Agencies, Councils, Regions

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

When a bottom – up approach is followed (usually a top – down approach is followed) needs are identified through stakeholders consultations (National Technology Platforms, Research Institutes such as Istituto Superiore di Sanità).

3) What are the coordination mechanisms?

We have 3 interesting examples (health and food are research topics in all these programmes):

1) A bottom – up approach was followed by the Ministry of Industry and by the Ministry of Research. The Ministry of Industry established a dialogue with Confindustria and its Federations (also Federalimentare) to define the contents of the Research Programme 'Industria 2015, Nuove Tecnologie per il Made in Italy'. The National Technology Platform 'Italian Food for Life' contributed to this process and the priorities identified in its Implementation Action Plan were mostly taken into account by the Ministry.

2) The Ministry of Research involved Federalimentare and the National Technology Platforms as 'Italian Food for Life' and 'Plants for the Future Italia' in the definition of PNR (Programma Nazionale di Ricerca), with a particular focus on food issues.

3) The Ministry of Research and the 4 Regions of obj. 1 (Calabria, Campania, Puglia and Sicilia) also involved Federalimentare and the Platforms in the definition of PON (Programma Operativo Nazionale) for the food issues.

4) How are the national programmes set up and shaped?

See the mentioned examples. We had meetings with Ministries and we contributed to the definition of the research programmes contents also through exchanging documents by e-mail and checking the final drafts during meetings.

5) Why and how are transnational calls implemented?

Ministry of Industry and the Institute for Industrial Promotion participate through RIDITT to CORNET II in order to promote cooperation among research and development collective programmes. This aim is achieved also through the publication of transnational calls. Italy participated to the 3rd and 8th CORNET call in 2007 and 2009.

6) How are cross-border research programmes set up and implemented?

There are at present several Interreg initiatives involving Italy and, individually, several Italian regions (Puglia, Friuli – Venezia – Giulia, etc…).

7) Is there a (need to) move from coordination to integration and how?

Yes, there is an Italian Public Bodies in this direction (e.g. 'Industria 2015').

8) How is multi-disciplinarity addressed?

Some Research Programmes (e.g. PON) foresee the possibility and encourage the presentation of more projects (costellazioni di progetti) integrated among them that should cover a whole chain (taking into account also different sectors) and involve different Italian Regions.

9) What are the cooperation initiatives?

Cooperation initiative are joint programming initiatives with EU countries. Italy (Ministry of Research and Ministry of Agriculture in particular) contributed, also through the action of the Technology Platform 'Italian Food for Life' to the adoption of the topic 'Food and Health and prevention of diet related diseases' for the Joint Programming Initiative.

10) How is transfer of technology - From knowledge to business - ensured?

Italian policies for innovation and technology transfer to enterprises operate both at central and local level. Several Ministries are involved according to their competencies, like the Ministry of Health, the Ministry of Environment, Territory and Sea Protection, the Ministry of Agricultural, Food and Forestry Policy and the Ministry of Foreign Affairs.

In addition, the central administration relies on a set of specialised agencies to design and implement innovation policies. Technology Transfer is ensured by the research programmes that foresee this kind of activity (sometimes training is 100% funded). It is also relevant the role played by RIDITT (Italian Network for Innovation and Technology Transfer to SMEs).

11) How are Intellectual Property Rights addressed?

According to EU regulation. An example can be the research programme 'Industria 2015'.

RIDITT has launched a dedicated section on Intellectual Property Rights (IPR) related issues where information are available on:

- Monitoring of the main developments and best practices at national and international level concerning IPR protection;
- Design of a pre-diagnosis methodology aimed at identifying SMEs potential for a more efficient IPR protection and valorisation;
- Pre-diagnosis pilot experiences on selected SMEs.

12) How is innovation supported?

All the mentioned research projects are focused on technology innovation (e.g. Contratti di Innovazione Tecnologica or Industria 2015 of Ministry of Industry). Innovation is one of the most important characteristics that projects must have to be approved. Innovation is considered ad the main factor to enhance the competitiveness of the Country.

13) How is knowledge intensive research promoted?

14) How is public/private partnership encouraged?

This partnership is deeply encouraged by our Ministries and Regions through research Programmes (e.g. 'Industria 2015, Nuove Tecnologie per il Made in Italy' and 'PNR', 'PON') that foresee as mandatory the involvement of companies and public/private research centres and universities. There is also another interesting instrument established by the Ministry of Industry (Contratti di Innovazione Tecnologica) that foresee contracts between private parties and public bodies. Companies and research centres prepare innovation projects that are evaluated by the Ministry and, if the project is approved, there is a negotiation and then the partners sign a contract with the concerned Public Bodies.

Contribution from Mr Francisco Tomás-Barberán from Spain

Please indicate how the following issues in the food and health research area are tackled in your country and if you have any particular good practice and experience to share

1) Which Institutions are involved (Ministries, Agencies, Councils, Regions etc.)?

Many organisations are involved. The main ones in terms of funding and direction of programmes are:

Name of funder	Type of organisation	Main areas
Ministerio de Investigación, Ciencia e Innovación (MICINN)	Government Department	Science and Technology
Ministerio de Medio Ambiente, Rula y Marino	Government Department	Sustainability and security of food production and supply
Ministerio de Sanidad	Government Department	Public health promotion, treatment of disease
Consejerías de Ciencia e Innovación (Different Regional Governments)	Regional Administrations	Science and Technology and Innovation

2) What are the mechanisms for the identification of needs (societal, academics, stakeholders etc.)?

Commissions are designed to identify the needs, and these include mainly the Industry, the consumers, the funding agencies, and the academia. National R&D Plans are prepared every four years.

3) What are the coordination mechanisms?

There is a National Institution, the CICYT, and the FECYT that coordinate this research activities between the different research areas. There is a need of a better coordination between the national programmes and the regional programmes. There is, sometimes, a duplication of efforts.

4) How are the national programmes set up and shaped?

The National Programmes are generally produced by members of the Ministry of Science and Innovation after receiving the input of the Commissions including the different stakeholders, Industry, Consumers and Academia.

5) Why and how are transnational calls implemented?

There are different offices I Universities and Research Institutes, and also in the Minsitry of Science and Innovation and the Regional Institutions that are responsible for establishing collaborations between different groups in terms of preparing proposals for transnational calls.

6) How are cross-border research programmes set up and implemented?

There are several Integrated Projects for research collaboration with other countries. The budget of these programmes in generally too low to run real cross-border research projects. This mainly supports travel and exchange of researchers between two institutions.

7) Is there a (need to) move from coordination to integration and how?

We still have a lot to do in terms of in creasing collaboration.

8) How is multi-disciplinarity addressed?

Multi-disciplinarity is always seen as a relevant added-value to the activities, but it is difficult to manage.

9) What are the cooperation initiatives?

There are different initiatives to promote cooperative research. The main one is the programme INGENIO 2010, that funds large cooperative projects under the leadership of the Industry, Program CENIT, to promote Research of Excellence, program CONSOLIDER and to promote cooperative research in the field of biomedical sciences, thye program CIBER.

10) How is transfer of technology - From knowledge to business - ensured?

There is a special interest in promoting the technology transfer. There are several Departments in Universities (OTRIS) and in the main Research Institutions (CSIC, OTT), that act as Technology Transfer Offices, and that are responsible for the communications and the contacts with Industry. There is a need to increase this technology transfer.

11) How are Intellectual Property Rights addressed?

Patents are presented and these are then licensed to companies that pay the corresponding royalties.

12) How is innovation supported?

This is starting in Spain now. Different strategies will be developed within the new Ministry of Science and Innovation. This was not an objective in previous programmes.

13) How is knowledge intensive research promoted?

All the research programmes aim to a knowledge intensive research. The scientific publication in high impact journals is always promoted, and is considered a good indicator for further research funding.

14) How is public/private partnership encouraged?

There are many taxing benefits for those companies investing in research con collaborating with public research Institutions to run research and development programmes. There are specific programmes to transfer the results of the research projects to the Industry (TRACE programme), and the above mentioned CENIT programme is oriented to enhance the public-private partnership.

15) Additional information not covered above

There has been specific programmes funded by the Ministry of Science and Innovation to promote research in the field of food and health and on functional foods. This programme has increased the number of scientists dealing with nutrition and the role of food in health in Spain.

European Commission

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Research in the food and health area has, up to now, been predominantly characterised by fragmented national/regional programmes (technology, health, nutrition, food safety, etc.). There are limitations in the existing approaches and there is a need to develop further the cross-border aspect of public research activities at Member State regional level in order to tackle the current societal challenges in the food and health area whilst also ensuring the competitiveness of the European food and drink industry. Recognising this fragmentation, there are attempts by different actors to overcome it and to develop joint activities. The Joint Programming Initiative (JPI) "A Healthy Diet for a Healthy Life" (HDHL), which is a broad based and member state driven initiative and a good potential approach, will attempt for the first time to coordinate research in the area of Food and Health at European level.
For the purpose of this report, experts have focused on research for prevention and not on medical research for therapies and treatments when considering the food and health research activities in their countries. It should be noted that this report does not include any assessment of research carried out under programmes financed at European Union level, including the 7th Framework Programme for Research and Technological Development (FP7).

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