European Commission

Designing the path

A **strategic approach** to EU agricultural **research & innovation**

Brussels, Charlemagne building
26-28 January 2016

#EU_AgriResearch

Agriculture and Rural Development

Conference report

May 2016

Agriculture and Rural Development

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More information

Conference web page:
http://ec.europa.eu/programmes/horizon2020/en/news/designing-path-strategic-approach-eu-agricultural-research-and-innovation

Disclaimer

This report assembles the contributions from speakers and participants in the context of a conference held on 26-28 January 2016. These contributions do not represent the views of the European Commission.

Summary

Three days to design the path towards future EU agricultural research and innovation

Entitled "Designing the path: a strategic approach to EU agricultural research and innovation", the conference built on the outcomes of a 6-month process started in June 2015 in EXPO Milan. Its objectives were to present what a strategic approach to EU Agricultural research and innovation could be and to discuss various aspects of how it could be implemented. Discussions allowed identifying concrete proposals that will help guide future activities.

Over **500 participants** (scientists, farmers, up and downstream industry, civil society and government representatives) attended the various pre-events, plenary and parallel sessions composing the conference organised by the European Commission on 26-28 January in Brussels.

Opening the conference, **Commissioner Hogan** stated that "*research and innovation will play a vital role in improving the future prospects of the agricultural sector and rural areas*". Acknowledging that "*we have allowed agricultural research to become a lower priority*", he emphasized how vital it is to invest in R&I, to meet the challenges ahead and allow the agricultural sector to become "*smarter, leaner and cleaner*". He also encouraged all research providers and funders, in Europe and at global level, to come together to pool resources, boost synergies and "build new fora for true collaboration". **Dutch Vice-minister Hoogeveen** highlighted the crucial importance of agricultural innovation in their Council presidency priorities for the first semester of 2016 and invited Europe to take a leading role worldwide.

The imperative of long-term, coordinated approaches

International experts were invited to introduce the main challenges facing farming and food systems, the most important trends and to present how they intend to tackle these challenges at various levels (European, global). **Philip Pardey** (University of Minnesota) focused on food security challenges and its underlying demographic features. He also presented the current investment trends in agricultural research and development, highlighting a geographic disconnect in the evolution of food demand and agriculture research and innovation. **Jerzy Plewa** (European Commission) then introduced the proposed EU agricultural R&I strategic approach. **Frank Rijsberman** (CGIAR) and **Xurong MEI** (CAAS) presented respectively the CGIAR strategy for 2016-2030 and the views of China on how to better coordinate at global level. The session confirmed the need to strengthen cooperation and partnerships at international level.

Societal expectations from farm to fork

A stakeholder panel then discussed expectations from consumers, retailers, food industry, farmers and civil society regarding agriculture research and innovation. Wim Verbeke introduced the audience to different drivers of citizen and consumer behaviour. The debate highlighted a need for closer and more genuine engagement with different supply chain actors, enhancing their role in changing the system. The panel also pleaded for greater attention to public benefits from publicly funded research, greater attention to health and nutrition content of food as opposed to quantity and a better anticipation of how the digital revolution may change the food system.

After these opening sessions, participants were invited to join six parallel sessions in which ways forward were discussed for a range of implementation issues. A panel was invited to react to parallel sessions outcomes. Conclusions are presented in the following page. In his closing remarks, **Commissioner Moedas** welcomed the conference outcomes as a rich input into the development of an EU research and innovation agenda for food and nutrition security.

How can we be more systemic in our approaches?

Being more systemic means considering all challenges simultaneously, integrating different components of farming systems, value chains and territorial features in a holistic manner and reintegrating medium to long-term approaches at various stages of the knowledge and innovation process. Development of metrics and methods enabling integrated assessment of systems performance would help this systemic approach, as well as participatory assessment of what desirable futures would look like and greater understanding of the role played by different actors.

How can we work better together at European level?

Enhancing synergies among Member States and with European programmes requires thinking more thoroughly about how to strengthen cooperation in the programming process and achieve better agenda alignment. It also requires making greater use of synergies and complementarities between various available instruments, simplifying their implementation were possible and facilitating participation of more Member States, including those with smaller capacities. Finally, linkages between regional, national, European and international level need to be improved.

How can we work better together at global level?

International cooperation, seen as an imperative in conference debates, could improve thanks to closer collaboration between government departments in charge of agriculture, international development and research and increased investments in research and innovation partnerships aiming to solve global issues. These would include multilateral and bilateral partnerships as complementary tools and should explore new cooperation mechanisms such as International Research Consortia. Cooperation with Africa and cooperation on soils were seen as priorities.

How can we modernize our knowledge systems?

Modernising our knowledge and innovation systems means sustaining efforts in the interactive innovation model, with a balanced support to each component of the knowledge creation process and improved linkages between these components (between basic to applied research, between different geographical scales, between different disciplines). Upstream, research priorities should be identified together with concerned parties. Open data and open access to results should become default standards. The science-rewarding system should be improved to better reward impact.

How can we make research results fit for policymaking?

Contribution of research and innovation activities to policy-making can be enhanced through continuous improvement of the science-society-policy interface, including a genuine and continuous societal engagement process, a careful check of how funded activities align with society needs (not only at the level of strategic orientations but also at later stages) and boosting outreach activities, building on better communication, interpersonal skills and upstream involvement of policy-makers.

How can we boost synergies with the private sector?

Synergies and complementarities between public and private R&I can be improved by focusing public support on the provision of outcomes which could not be expected otherwise, which deliver public benefits along with private benefits and which integrate long-term objectives. Activities should focus on developing support instruments for public-private partnerships with specific focus on facilitating SME participation, raising awareness on available support, increasing flexibility and accessibility of financial instruments and exploring possibilities to support long-term projects.

How can we better involve farmers in creating and exchanging knowledge?

Better involvement starts from the recognition of the central role that farmers play in the knowledge creation and exchange process: they are not only end-users but should be involved genuinely and upstream in the definition and implementation of research and innovation activities. Long-term support to the multi-actor approach, which requires such involvement, is indispensable to achieve progress, as well as improving mutual understanding between scientists, farmers and intermediaries, mutual understanding, through sustained attention to facilitators such as advisors.

Report

Opening session: advancing policies through research and innovation

Opening the conference, **Commissioner Hogan** stated that "*research and innovation will play a vital role in improving the future prospects of the agricultural sector and rural areas*". Acknowledging that "*we have allowed agricultural research to become a lower priority*", he emphasized how vital it is to invest in R&I, to meet the challenges ahead and allow the agricultural sector to become "*smarter, leaner and cleaner*". He also encouraged all research providers and funders, in Europe and at global level, to come together to pool resources, boost synergies and "*build new fora for true collaboration*".

'We must allow the agricultural sector to become smarter, leaner and cleaner'
Commissioner Hogan

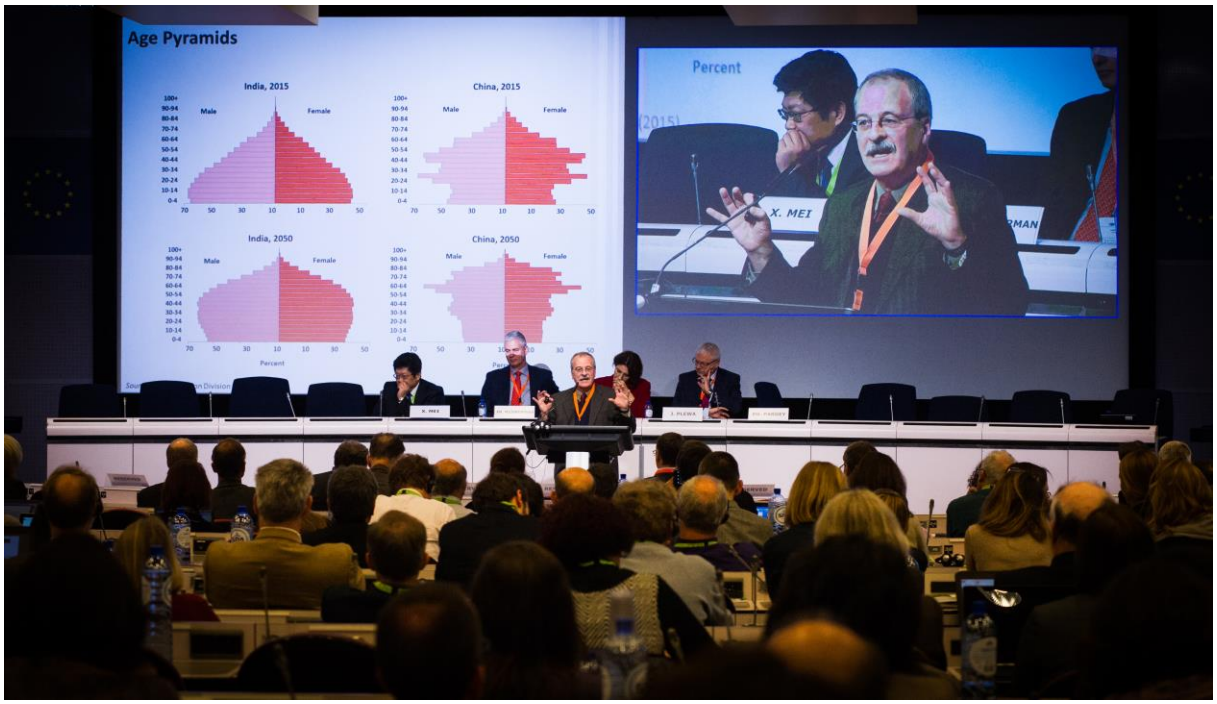
Hans Hoogeveen, then took the floor on behalf of the Dutch presidency of the agriculture and fisheries Council. He highlighted food security, safety and transparency, climate change, food waste and losses and new opportunities for biomass use as key challenges for the future. "*It is clear that everybody has to be fed and provided with energy, but it must be produced in a way our earth and nature can cope with it*", he said. Stressing that research, innovation and education have a crucial role to play in solving these challenges, that a long-term strategy is indispensable and that this conference came at the right moment, he invited Europe to lead the way towards agriculture and food research and innovation geared to achieve economic but also social benefits. He further recommended supporting R&I activities which address multiple goals, are interdisciplinary and interactive, challenge knowledge institutes and private sector to work together, make their results available in an open and transparent way and invest in international cooperation, in particular with Africa.

Session 1: the imperative of long-term, coordinated approaches in agriculture research and innovation

Professor **Phil Pardey** (University of Minnesota) introduced the conference by presenting on one hand the most important challenges facing global food systems and on the other hand the trends in research and development investments around the world that aim to respond to these challenges.

~~As a preamble,~~ he recalled that it takes between **12 and 100 years** for an investment in research to translate into substantial change on the ground, hence the imperative of taking a long-term view at research programming. He then illustrated expected changes in food demand in the coming decades. Population is expected to keep growing, although at a lower rate than in the past decade. More importantly, it will **shift towards Asia and in particular Africa**. GDP per capita is also expected to increase in the coming decades, especially in high and middle income countries, growth in low-income countries remaining slower. In parallel, **agriculture production is projected to shift location** in relative terms, with high income countries and Europe representing less and Asia and Latin America representing increasing shares of the global output, again lowest income countries and Africa remaining behind. **Production is also highly concentrated**, with over 50% of the production for 10 main commodities concentrated in the top-10 countries and a decreasing number of species used for food worldwide. This specialisation and spatial concentration results in increasing **vulnerability to shocks**, such as climate changes or diseases.

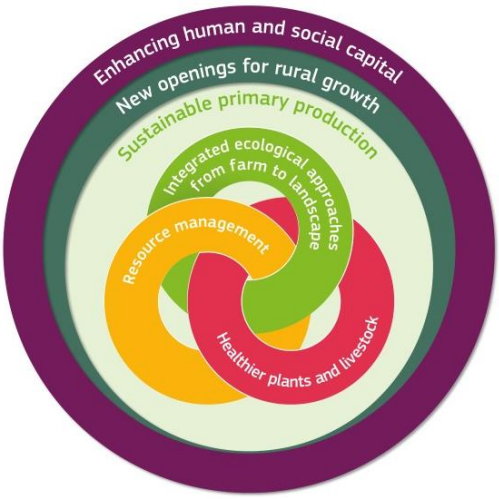
Report



In parallel, investments in agriculture and food R&D have been growing as well but with a **shift in the list of the top-10 countries involved**. Western Europe public investments in agro-food research and development (R&D) represent only 17% of the $44 bn of global public R&D efforts, more than the US (10%) but behind China (24%). China, India and Brazil alone make up 36% of the global public investments in R&D. R&D efforts are very concentrated spatially, mostly in rich countries and fast growing middle-income countries, with three European Member States in the top-10 countries (France, Germany and Italy). On the contrary, efforts are stagnating in low-income countries were the food security and climate challenges will be most acute in the coming decades. The **private sector plays an increasing role**. Private R&D represents 44% of global investments, equally highly spatially concentrated.

Phil Pardey concluded highlighting the "*growing disconnect between the geography of agricultural demand and the location of agricultural R&D performance*". He argued for a **rethink of the funding mechanisms for public research**, illustrating the high and sustained rates of return on investment that can be observed on agricultural research (12 to 26 times on average). Project-based funding may not always be the most efficient way to cope with long-term challenges.

Jerzy Plewa, Director General of DG AGRI, then introduced the proposed agricultural R&I strategic approach. This approach is structured around five main priorities. The first three refer to sustainable primary production and are closely interlinked: "**resource management**", "**healthier plant and animals**", and "**integrated ecological approaches at farm and landscape levels**". The last two, "**New openings for rural growth**" and "**Enhancing human and social capital**", seek to enhance rural innovation by exploring questions around value chains, territories and knowledge and innovation systems in which primary production operates. The last chapter of the draft strategy paper is dedicated to implementation issues, which were at the core of the conference debates.



Report

Frank Rijsberman, CEO of the CGIAR[1] presented the activities of the consortium and their vision for the future. He insisted on three top-challenges which call for an "*urgent and radical transformation of today's agri-food systems*": **poor diets**, **planetary ill health** and **massive rural underemployment**. To tackle these challenges, Frank Rijsberman identified key opportunities around the **life sciences revolution**, which enables a greater understanding of biology which has "*benefited medicine and is now reaching agriculture*", **big data** and **open access** to publications and data which is likely to create more impact and a **renewed policy focus on agriculture and food**. He then presented the key elements of the CGIAR's strategy for 2016-2030, focused on achieving selected grand challenges contributing to sustainable development goals with second generation CGIAR research programmes which are expected to bring a return on investment of $17 per dollar invested. The strategy is structured around three main goals: **reduce poverty**, **improve food and nutrition security**, **and improve natural resources and ecosystem services**. Each goal's achievement will be measured against quantified targets and progress will be achieved through 'intermediate development outcomes'. This well-structured results framework should enable better assessment of the achievements by 2030. **Gender and youth**, **capacity development**, **climate change** and **policies and institutions** come as complementary cross-cutting themes. Finally, just as the EU strategy considers implementation aspects, the CGIAR strategy has listed a series of "**guiding principles**" and "**strategic enablers**" which should guarantee efficient implementation. Excellence in science, accelerated impact and inclusive partnerships are among those which echo well with European orientations.

Dr Xurong MEI (Director General for Research Management, Chinese Academy of Agricultural Sciences) finally took the floor to introduce to the audience some of the key trends and challenges of Chinese agriculture and agricultural research and to offer China's views on how to strengthen cooperation at global level. Chinese agriculture supplies a high proportion of global output and is also very intensive in resource use. In the future, China intends to move towards an innovation-driven agriculture which pays more attention to **quality and nutrition** along with quantity, uses **ecosystem services** better (as opposed to overexploiting resources) and adapts to **labour shortage** and **increased production costs**. **Climate change adaptation and mitigation**, **poverty reduction** and **improvement of rural livelihoods**, **sustainable land and water use** and better **pest and disease control** are among the most important challenges identified. To face these challenges, China will strengthen both basic and applied research activities and infrastructures and introduce integrated approaches of regional agriculture development paying attention to growth generation and environmental constraints. To improve coordination of agriculture research and innovation at global scale, Dr Xurong Mei suggested to go for agriculture research that would be "*innovative, harmonious, green, open and shared*". He proposed to explore ways to enhance bilateral and multi-lateral cooperation by creating novel mechanisms such as **international conferences** or **international joint labs**, by participating in existing mechanisms such as **flagship initiatives in cutting-edge areas** (genomics, big data…), and by encouraging the establishment of an **international cooperation platform** to enhance information exchange and collaboration. He quoted the EU-China Flagship initiative on Food, Agriculture and Biotechnology as a positive example. He finally introduced the themes of the upcoming **Meeting of G20 Agricultural chief scientists** (MACS) in Xi'an in May 2016 and of the **Global Forum of Leaders for Agricultural Science and Technology** (GLAST) in Hainan in November 2016, inviting all to join.

[1] The CGIAR is a worldwide partnership addressing agricultural research for development which gathers 15 international research institutes.

Report

Aminda Leigh then opened the floor for discussion, which entered into various issues:

- **Mechanisms and partnerships which can help to get innovation out to farmers**: research funders increasingly want to see research outcomes reaching the ground quickly. Speakers explained that **partnerships with extension services and innovation agencies** are the most natural and efficient were they still operate despite the public disinvestment in these activities. They also highlighted the **increasing role of the private sector** (seed companies) in advice to farmers and hence the necessity to work with them. Agricultural research for development also works with large **NGOs** which help reach out to large number of farmers.

- **Potential for more research on non-food uses of biomass**: responding to the question posed in particular in relation to Africa, Frank Rijsberman explained that food and nutrition security are a higher priority and that uses such as **biofuels are often regarded as threats to food security**. He however recognised the potential of some non-food crops in some specific farming systems.

- **New breeding technologies absent from the EU strategic approach**: Jerzy Plewa explained that the strategic approach proposed by the European Commission was broad enough to accommodate all technological developments that would answer the challenges and priorities that are presented. Recalling that Horizon 2020 is challenge-based, he insisted the strategy document should remain short, further specificities being developed in the precise calls or even in the proposals which are submitted as response to specific, challenge-based calls.

- **Drivers of change in farmers attitudes and how to take into account the great diversity of farmer profiles and multiplicity of other influences such as land use rights, regulations, subsidies**: in the field of agriculture research for development, Frank Rijsberman explained that CGIAR had moved its target group to include not only the small holder farmers on which they tended to concentrate but also the rural and urban poor in general who also contribute to the food system. Jerzy Plewa recalled that land ownership legislation is not under EU legal competency and therefore cannot be acted upon from the EU level. However, the idea through the European agricultural policy is not to distinguish between different types of farmers but to concentrate on those who produce, which may indeed have different profiles. Subsidies are also conditioned to sustainability requirements. Research should cover different profiles and activities of the European Innovation Partnership on agriculture are open to all types of farmers. Phil Pardey identified contractual arrangements with farmers as a field which tends to be both promising and under-researched (insurance schemes, sustainability contracts between food companies and their suppliers).

- **Methods for calculating rates of return on investment**: Phil Pardey explained that the method was set up in 1958 and figures presented during the conference are based on analysing around 400 studies. To calculate these return rates, economists combine long streams of research and innovation costs which have been incurred with long streams of benefits. "*It is challenging but doable*", he argued.

- **Importance of nutrition security and human health, which could be further emphasized in the strategy:** Jerzy Plewa confirmed the main focus in the strategy is on food security and sustainability and acknowledged that nutrition security is a challenge.

- **Looking at challenges regarding the whole Bioeconomy instead of just food production and consumption:** responding the question addressed to him, Philip Pardey

commented that the broader evolution of the Bioeconomy is part of a process of increasing specialisation and integration of the supply chain with changing relationships between different actors. This is happening in food supply chains where R&I are trying to generate value which can be captured in different ways. And likewise there is a development of different non-food applications (including biofuels). These activities are developing, are very high-valued and tend to be "niche". The question posed to economists is whether there is a market failure there. The capture of the created value by private interests tends to mute the public role in supporting its development. If the innovator is going to get great benefit from R&I, there is a question whether the taxpayer should pay for that research or whether the market could incentivise innovation instead.

- **Possibility to accelerate yield growth back to the levels we had in the past**: this question is heavily debated within the scientific community. On one hand, some argue that yields' plateauing is inevitable. On the other hand, current changes in science are fundamental. "W*e have used only a very small portion of the genetic variability which is available to us*" said F. Rijsberman. And the public sector may need to catch up with the investments that the private sector has made in building pipelines that enable using this variability.

- **EU's role in financing long-term investments such as those described by CGIAR, but which are not easy to reconcile with the short-term budgetary cycles**: Jerzy Plewa agreed with these limits and emphasised that the EU is not the only source of funding for agricultural research. Member States are also financing these programmes and the private sector can also contribute through partnerships.

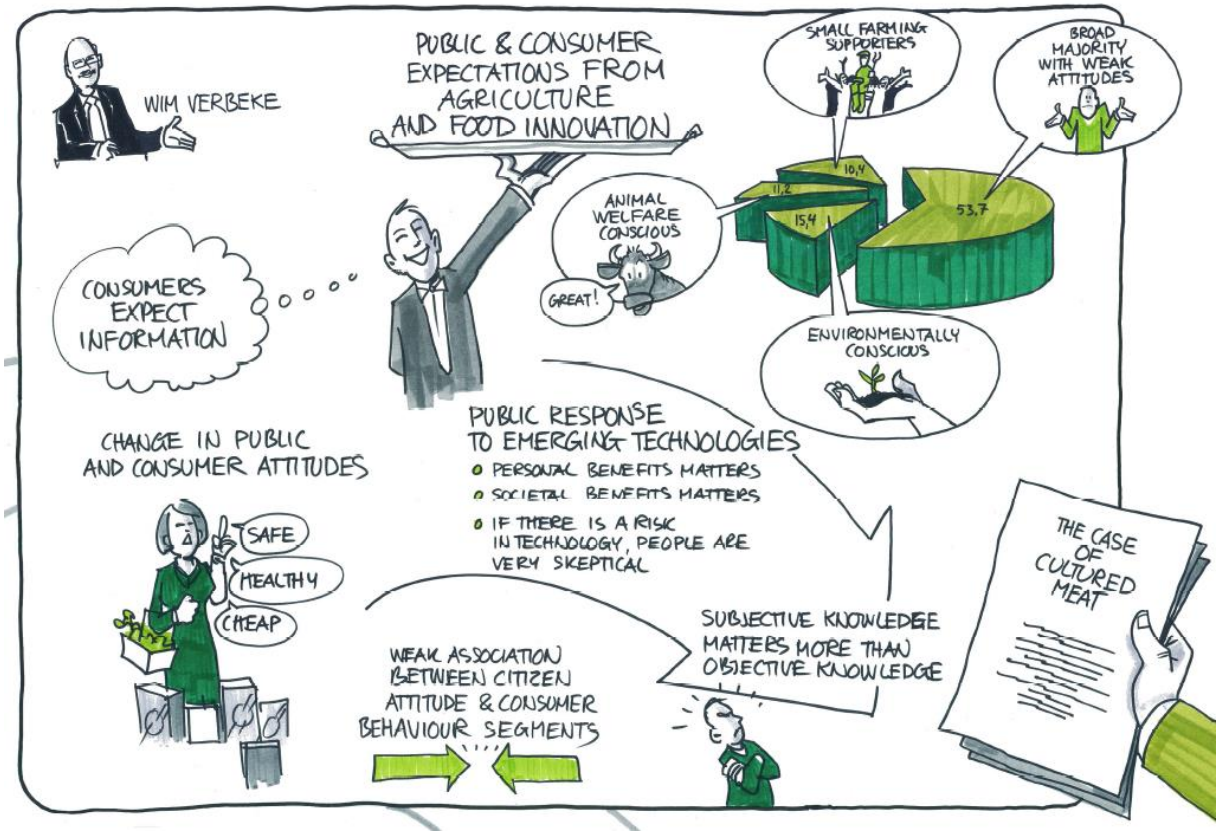
Session 1 contribution to the strategy paper at a glance:

Challenges needing strengthening:	Implementation aspects needing strengthening
Spatial concentration (of production, of R&D investments, of demand growth). Disconnect between the geography of demand and of agricultural R&D performance. Increasing role of private R&D, but spatially concentrated in richer countries. Rural poverty and underemployment in developing countries. Nutrition security and human health. Diversity of farmers, need to consider wider target groups than just farmers or rural poor, need to reach out to all (small-holders producing the biggest quantity of food worldwide).	Reflection around funding mechanisms (short-term projects versus longer-term programmes). Difficulty in reconciling this with short-term financing cycles at EU level. Need to seek synergies with MS and private sector for financing longer-term partnerships. Public funding should be concentrated on R&I activities for which there is public interest and market failure. Food security first as a principle. Imperative of international cooperation, in particular with Africa. Explore novel cooperation mechanisms. Necessity of partnerships with extension services, innovation agencies, but also private sector and NGOs to better involve farmers

Session 2: Societal expectations for research and innovation from farm to fork

Four panellists and two members of the European Parliament were invited to give their views on how well the proposed strategic approach responded to the needs of the farmers, food businesses, retailers, environment and society in general. The panel discussion was introduced by Professor Wim Verbeke who presented the results of scientific studies on consumer expectations.

Public and consumer expectations from agriculture and food innovations



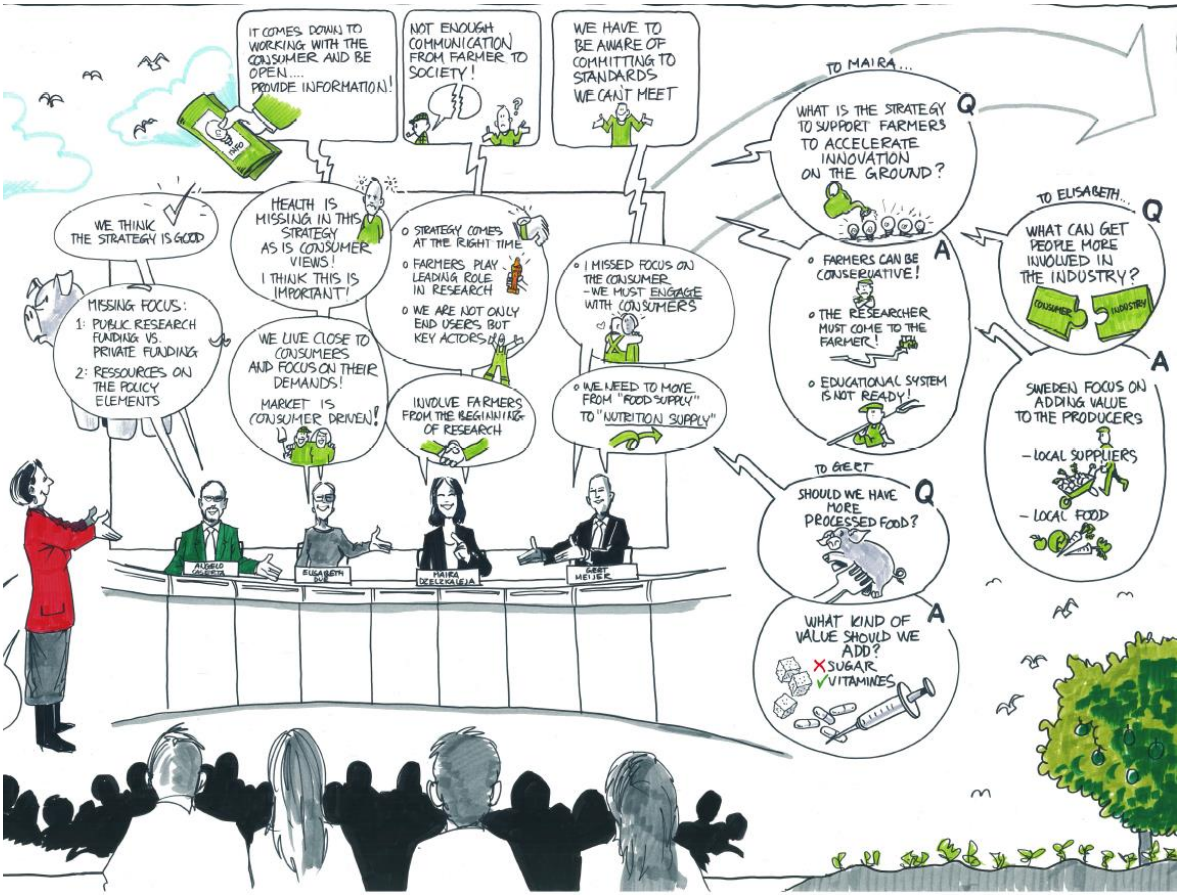
Wim Verbeke, University of Ghent, first highlighted that consumers expect more and more information in relation with the food they buy, not necessarily when they purchase it but at any time. They are also increasingly demanding, expecting food which should always be healthier, safer, tastier and more recently also more sustainable, environmentally friendly and authentic while remaining affordable. Main trends are about **safety becoming less important** (in relation with very high food safety level in Europe at least) and **sustainability** and **ethical concerns** becoming more important as well as **practical use of the food products** (eating quality, convenience). He however highlighted that people have these expectations more as citizens than as consumers: there is a **duality between what they expect and how they actually behave**. A European project looking at pork value chains demonstrated for example that, although people preferred environmentally-friendly production systems, with outdoor rearing, small-scale producers and a diverse quality as a result, the majority of consumers had a weak attitude to these issues at purchase stage. Moreover, consumers with weak or stronger attitudes were nearly equally distributed among consumer groups which consumer more or less of these products.

He also explained that acceptability of innovations is increasingly questioned. Scientists identified **18 issues which influence the public and consumer response** to emerging agro-food technology. Perception of concrete and tangible individual benefits or perception of a benefit for the environment will generally encourage a positive response. On the contrary, perception that main benefits are economic or to the benefits of the industry will create suspicion, as well as potential

risks related to the technology and lack of trust in science. Plenty of factors such as subjective knowledge, cultural habits and ethical issues, controllability (labelling) and perceived freedom of choice also enter into account. Wim Verbeke further elaborated on two concrete examples of cultured meat and insects as feed for animals, illustrating more concretely the process of consumer attitude formation and concrete factors that influenced a positive of negative attitude towards the innovation. He finally illustrated the existence of different consumer segments when it comes to attitude to healthy eating and/or environmentally-friendly eating. Figures show that the two are not necessarily connected automatically. A study conducted with 2 700 consumers in four countries (BE, DE, NL, UK) shows that 45% of them are not or moderately interested, 30% are interested in both healthy and sustainable eating but 22% are interested in healthy eating only.

Wim Verbeke concluded by suggesting some ways forward to **better assess and understand consumers roles**, expectations, behaviour, to explore **how to best engage and reconnect** them with producers, while taking into account the multiplicity of factors which enter into their decision-making and the fact **they are not alike**.

Panel discussion



Aminda Leigh first invited the four panellists to provide **their thoughts on the draft strategy paper** as well as a few comments on the previous presentation. The contributions allowed highlighting strong points and elements that were missing or needed to be strengthened or completed in the strategy paper:

- **Strong points**: Maria Dzelzkaleja welcomed the strategy itself which comes at a **timely** moment when we are discussing innovative solutions and approaches for European farmers. She also welcomed the emphasis on interactive innovation, though insisting that **farmers are not only "end-users" but they are at the start of the knowledge creation process**. It is crucial therefore that they are involved from the very beginning in research and innovation activities. Only in this way can we secure application of research

outcomes in reality. Angelo Caserta commented that the strategy **takes well into account the environmental challenges**, the impacts of production systems on biodiversity and climate. It recognises the impact of pesticides on environment and human and health and explores the functional role of biodiversity.

- **Points needing strengthening**: Elisabeth Due suggested strengthening the importance of **health** aspects, which is very important by the consumers as far as they can see from a retailer's point of view. She also suggested taking into account the **role of retailers in enhancing rural growth**, commenting that providing more places were farmers, industries and retailers could meet at local level would be beneficial. Gert Meijer welcomed the presentation by Wim Verbeke, commenting the **focus on consumers** was not strong enough either in the paper. He further elaborated that the challenge is not only to understand consumer behaviour but also to **engage with consumers to achieve behavioural change** as challenges cannot be solved without their engagement. He then stressed the crucial role of farmers who should be "*proud of what they are doing*" but also of the other **actors in the supply chain**, who are all closely **interdependent**. He would like to see this interdependency better reflected in the paper. The food industry would for example benefit from research on crops which require minimal or no processing or primary products which can be used alone as one ingredient. Finally, he insisted on the importance of nutritional aspects. While understanding the focus on yields, he argued that the main challenge is to work on production systems which deliver more protein, minerals and vitamins. He echoed the suggestion from Dr Mei earlier to **move from "*food supply to nutrition supply*"**. Angelo Caserta would like to see aspects related to the **balance between what should be publicly funded and what should be financed by the private sector** better addressed in the paper. He would also like the paper to go **beyond the paradigm of producing more** and really focus on how to produce better, how to distribute better and face the access problem worldwide. Finally, he would like to see more research activities on **policies** and how they act as a driver of change or not.

Panellists were then invited to propose ways to match the gap between farmers and other supply chain actors and the consumers. All emphasized again the need to **better understand what consumers need and want** and to engage with them. Elisabeth Due explained that ICA independent retailers in Sweden are well spread over most of the countries municipalities, both urban and rural, and that they seek very good contact with local producers from whom they purchase around one third of what is on their shelves, and with consumers who are favourable to this attention to local sourcing of products, especially for food. So **retail in that way can act as a bridge**. Maira Dzelzkaleja agreed the connection with retailers is important. She also stressed the **difficulty of adapting farm management**, which requires long-term investments, to **rapidly changing consumer attitudes**. She sees research and innovation as a way to produce innovative solutions which can help increase adaptability. Wim Verbeke further commented that the interest of consumers in local foods is growing. An interesting question for research to investigate would be "***Is it possible or not to feed local populations with local food and to which extent?***". For Maira Dzelzkaleja, another question is also to know **whether consumers are willing to pay a fair price for products** which match their requirements (environmentally friendly, ethical, local, small-scale, extensive…). Angelo Caserta also commented that beyond the general disconnect, we can also see a form of **convergence between what people want to buy and what farmers are ready to supply**. He took the example of organic food for which both demand and supply are increasing. So it is interesting to see how labelling can help match the gap. Finally Elisabeth Due opened perspectives on the **digital revolution**, which **will certainly change the way people buy their food in the future**. On-line sales are rapidly developing and once logistics are in place, consumers will have much more possibilities to buy their food in different ways.

The audience then brought more aspects into the debate:

- **What strategy to support farmers in accelerating innovation**: Maira Dzelzkaleja listed a series of enabling factors which are necessary to facilitate involvement of farmers in R&I and the uptake of the outcomes: better use of the policy tools which have been made available (EIP-AGRI, multi-actor approach), good internet access, greater education support in adopting for example new technologies such as precision farming.

- **Capacity of increased information to lead to more plant-based diets**: Wim Verbeke explained that this shift is happening and unlikely to be reversed in Northern countries as a result of wide media coverage of many safety or environmental related issues. However, animal protein consumption is increasing and will keep increasing in other parts of the world.

- **Transferability of European research results regarding consumer behaviour to other parts of the world:** Wim Verbeke illustrated based on concrete examples that this is not possible, due to different development stages. Consumers in China for example are much more sensitive to food safety which entails preferences for large-scale farms.

- **Role of multi-disciplinary research and social sciences in the strategy**: this role is well acknowledged in the strategy paper, clearly when it comes to understanding farmers and involving them, and also with regards to consumers. Multi-disciplinary research and social sciences, if properly embedded in the activities and not as window dressing, can really make a difference.

- **Taking a comprehensive view at consumption**, which not only extends to the food that consumers buy from the shops but also what they consume in restaurants, canteens etc. Consumer behaviour is to be looked at there as well.

- **Importance of integrated ecological approaches as an overarching objective and not as a niche activity:** both the audience and Angelo Caserta supported this need and expect the final version of the strategy to make that clear.

- **Relevance of the focus on productivity**: both the audience and panellists agreed that we need to produce better rather than more, especially with higher nutritional content.

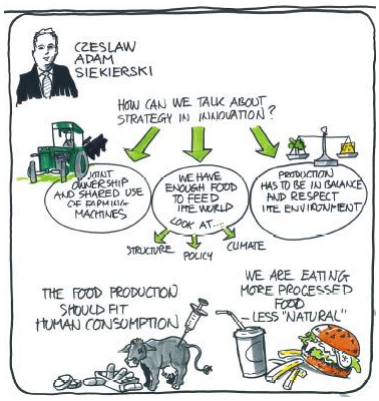
- **Interest of exploring production methods labelling**: consumers say they want more information but they do not necessarily act upon it. Information can be sourced from many other sources than labels. Engaged consumers know where to find information. There are indeed too many labels. Considering the labelling and information overload, it may be as interesting to explore whether we can bring back trust in the food systems.

- **Environmental friendliness of short-food supply chains**: for value chain, any value adding step should bring real added value the product. Whether short chains are better depend on the kind of food we are talking about. We should be careful to processing steps which are not contributing to health. From farmers' point of view, short supply chains mean direct sales etc. it can be a solution in some places (close to densely populated areas) but they are less so in others and should not be considered as a solution for all.

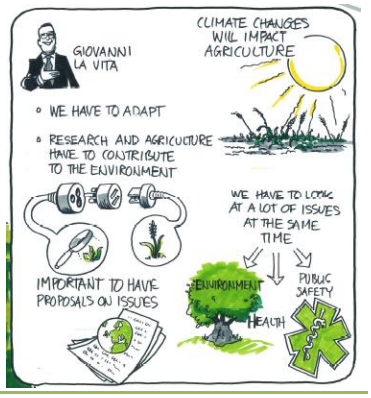
- **Preventing food scares and scandals**: traceability appeared as a solution to at least be able to explain problems and prove good attitudes.

As a conclusion, panellists highlighted that the way we are consuming food will change, in particular with respect to proteins. Focusing on sustainable diets is more important than looking at food items individually. Finally research should focus on contributions to public goods.

Panel closing remarks



Czesław Adam Siekierski, Chair of the European Parliament Committee for agriculture and rural development, offered his thoughts, many of which confirmed the content of the debates. He emphasized the need to talk about productivity and income. However, he also stressed that we have made great progress at producing more, increasing productivity by 70 or 80%. He acknowledged the issues of food waste and the issues of access to food. "Environment is one of the key challenges" he said. "*Agriculture needs to be respectful of the environment and research and innovation can ensure it is*". He encouraged a focus on greater resource management, which he said was well covered in the strategy and on health. He then listed some developments such as precision farming which could allow a low intense use of inputs and pleaded for lowering dependency on protein imports by working more on protein and pulses. He finally recalled that farmers need to be competitive on the global markets.



Giovanni La Via, Chair of the European Parliament Committee on Environment public health and food safety further elaborated on challenges related to climate change, food waste and obesity problems to which research and innovation must help to bring solutions. He recommended looking in particular at how agriculture can contribute to reducing emissions and at diets and how they can be made more sustainable by using different types of food. He pleaded for more legislative activity along with R&I activities.

Outcomes of session 2 at a glance:

Challenges, themes or issues needing strengthening:	Implementation aspects needing strengthening
Health, connection between health and sustainability, food processing bringing real added value. Focus on consumers expectations: understand them AND engage with them to achieve change Producing better rather than more, moving from food supply to nutrition supply Role of retailers in rural jobs creation Interdependency of supply chain actors Feasibility of local food supply (to what extent?) and situations in which short supply chains are likely to deliver interesting outcomes. Willingness of consumers to pay a fair price for products matching their expectations. Labelling as a source of convergence between consumer expectations and suppliers. But building food systems which are worthy of trust a more interesting option considering information overload. Digital revolution as a game changer in consumption. More research on policies and their role as a driver of change.	Better explain distribution between what should be publicly funded and what should be covered by the private sector. Research should be for valorisation of public goods. Farmers not only end-users but also at the start of the knowledge creation. Involve them from the beginning. Needs for research on consumer preferences also in non-EU countries: results do not match. Important role for multi-disciplinary research, multi-actor approach, social and human sciences, both on consumer side and on farmer side.

Concluding plenary: what concrete actions to kick-off implementation of the long-term strategy?

Reports from the parallel sessions

Synthetic reports of all parallel session are appended to this report. We provide here an overview of the concrete actions which were proposed as an outcome of parallel sessions' debates.

Coordination across scales, departments, policies

- Improving **linkages between regionally-funded, nationally-funded and EU-funded research** (in particular via ERANETs) and between **EU-level initiatives and international initiatives**; using better JPIs as a vehicle for internationalisation and participation in multi-lateral cooperation arenas.
- Improving **articulation between regional, national, European and international levels**.
- **Developing metrics and methods** enabling integrated assessments of systems' performance, across **space** and **time**, covering **ecological**, **economic** and **social** benefits. These methods should build on a **wide range of expertise and disciplines**.
- **Develop stronger alliances between different government departments** in charge of agriculture, research and innovation and international development and cooperation, to increase available resources and maximise policy leverage at different scales.

Societal engagement and greater outreach

- Using **genuine societal engagement** processes to establish the full societal relevance of research priorities; this should be considered as a continuous process, building on trust, and not as a one-off exercise; the uptake of outcomes in research programming should be secured; more effort should be put in exploring ways of engaging efficiently with society.
- **Boosting communication and outreach activities**, building on better communication and interpersonal skills and on upstream involvement of policy-makers, value chain actors and society.

Programming processes

- **Thinking more thoroughly about how to strengthen even more cooperation between Member States in the programming process**, to further alignment and keep reducing duplication of efforts.
- Ensuring alignment of research and innovation activities with societal challenges, their potential impact and contribution to policy goals **at all programming steps** (and not only when defining strategic orientations); anticipating government needs for future policy-making.
- **Assessing what desirable changes would be**, in order to fine-tune policy targets and further specify how research and innovation can contribute to reaching these targets. This requires both **participatory exercises** engaging with society to better define what people want and **increased support to foresight, horizon scanning, scenario-building, visionary thinking**.
- Exploring through **participatory** research **trends regarding the role played by different actors on how the system works**, different **drivers of change** and how they can be used from a policy point of view to achieve change (governance empowering consumers or citizens, labelling, urban food planning, public procurement, valuation of non-economic benefits or natural capital, agro-food policies…).

Instruments

- Exploring **mechanisms which could be used to address long-term challenges and public good provision** through **long-term projects** (feasibility of renewable instruments).
- Making greater use of **synergies and complementarities between the different types of instruments** in the toolbox (JPIs, ERANETs, CSAs, COST, ESFRIs etc.), in particular cooperation between different JPIs, cooperation between JPIs and research infrastructures.
- Exploring ways to i) **simplify the most burdensome instruments** (ERANETs) to facilitate implementation, ii) **facilitate participation of a greater number of Member States in European cooperation initiatives**, for example by assessing possibilities to share resources.
- **Investing further in research and innovation partnerships** to solve global issues (including triangular partnerships); multilateral cooperation should come as a complement to bilateral cooperation and not aim to replace it.
- **Exploring novel cooperation mechanisms** such as International research consortia, like the one recently launched on animal health.
- **Promoting SME participation in R&I partnerships** via awareness raising activities, workshops, groupings and organisations, dedicated advice at EU and national levels; explore whether SME support should focus on certain types of innovative SMEs or not.
- **Developing support instruments for public-private partnerships with specific focus on facilitating SME participation**; improving flexibility in terms of project size, duration and partnership composition; exploring ways to combine maximum open access to non-participants without compromising investments from participants.
- Increasing **flexibility in financial instruments**.

Research methods and approaches

- **Keep increasing requirements for inter, multi and transdisciplinary research, multi-actor approaches and integration of social and human sciences**.
- Fostering an **interactive research and innovation process**, with balanced support to each component of the process, allowing collaborative basic research and translational research to receive sufficient support and freedom, improving links between basic research and applied research and involving practitioners throughout the process.
- Encouraging **open data and open access as default standards**, by working in particular on interoperability and on business models enabling data and knowledge providers to be rewarded for their work while at the same time making it available.
- Improving **the science-rewarding system** to enhance science delivering for practice.
- Maintaining **long-term support to interactive innovation through the multi-actor approach.**
- **Supporting intermediary organisations** which enable networking at various scales and effective peer-to-peer learning, in particular **advisors.**
- Supporting actors in identifying complementary competences.

Round table discussion: What are the crucial points to take into account to successfully implement the strategy?

Four panellists were invited to react on the outcomes of the conference parallel sessions and to provide their views on the crucial points to take into account to successfully implement the strategy. The following points emerged as important:

- **Shortening the distance between researchers and farmers:** "*We have to reduce the distance between research and the farmers to one centimetre, one inch, which is the distance between the finger and the seed you put in the soil*" said Roberto Ridolfi (European Commission). This need was further supported by Hervé Guyomard who referred to the importance of **partnerships** to secure long-term collaboration. He also emphasized the need to **improve understanding** in both directions: researchers must pay greater attention to what farmers are trying to achieve and to their everyday needs; farmers need also to understand better what research is. Valentina Hazic further emphasized the **critical role of advisors as interface between researchers and farmers and between government and farmers**. "*Research and practice can be bridged through institutional pluralism and also by associating different stakeholders*" said Valentina Hazic, farmer in Croatia. She further argued that progress can be achieved only if there is a comprehensive knowledge base available. Roberto Ridolfi also questioned **who was doing the extension instead of the public sector** who was doing it before: probably the private companies he said. We should assess whether that is a promising way forward or not. The upstream industry also promoted its role as research and development providers closely connected to their clients. Farmers' organisations should be considered also as an important conveyor belt of knowledge to the farmers. And the issue of language was finally raised: farmers do not always speak English. **Translation matters** to dissemination.
- **Basic research needs to be supported as well as applied research**, if the knowledge that will be needed in a few decades is to be produced. "*Research needs also some form of freedom*" said Hervé Guyomard, from INRA. "*If we want to develop genomics: we need freedom to do that, of course taking into account everybody's needs*".
- **Raise interest in farm innovation at all levels in all countries which are less advanced** (in and out the EU): raise farmers education level, raise capacity to understand and take up innovative practices, bring back pride and motivation, encourage young people to enter into farming, foster exchange of experience between more and less advanced countries. Improve access to information.
- **Having a comprehensive approach to agriculture, food and the environment:** issues such as climate-smart agriculture, diversity of farming systems, biodiversity, agro-forestry appear as major topics to re-invent food production in a sustainable way.
- **Broadening the scope in territorial terms:** it is crucial to include more and more all actors that impact on agro-food systems, not only rural actors. Urban food systems, peri-urban food systems for example need to be further researched. There is a need to understand better the impact of various production systems on economic and social development as well as on the environment, simultaneously. "*We need to have metrics to assess the trade-offs between different choices and take the right decisions, short-term trade-offs and long-term trade-offs*" said Hervé Guyomard.

- **Role of the private sector:** in the field of international cooperation and development the EU has approved a new policy regarding the role of the private sector, which foresees a bigger emphasis on providing investment means and a lesser emphasis on handling subsidies. Agriculture is the biggest private sector in the world. Roberto Ridolfi mentioned two initiatives as a source of inspiration: AGRIFIN (Agriculture finance support facility) which helps SMEs accessing funding and the financing of research centres which operate in close contact with the territories.

- **Importance of small-holders for food security**: 85% of the food worldwide is produced by small-holders.

- **Taking a different look at food security**: need to move towards less intensive land-use by changing the way we see the green economy and the circular economy. Change diets.

- **Alignment and articulation between of EU strategy and national strategies, and also articulation between these two levels and the international level:** we need to set up the appropriate links. Hervé Guyomard gave the example of international wheat initiatives in which France, United Kingdom, Spain, Italy and Germany are involved, without the European Commission taking part. He further elaborated on the interest of regional-level initiatives but on the need to have also research activities covering a sufficient diversity of situations to yield generalizable results which can feed into national, European or global policy-making. "*We know that some solutions can be more efficient in some areas and less in others. We need to develop models that help assess if one solution can fit or not in one area*", he said.

- **Need to analyse also regional innovation systems:** Jaume Sio Torres stressed the need for each region and each State to analyse their own knowledge and innovation systems and assess whether all components and aspects are working well together or not. With the focus on innovation in regional development programmes and in rural development programmes, regions have a greater role to play. "*This bottom-up approach makes it easier for all different types of actors to be more involved and that's key*", he said.

- **Strengthen the place of research and innovation in agricultural policy:** "We take it for granted that research and innovation have a great place in agricultural policy but I am not sure it is true" said Jaume Sio Torres, arguing that the connection has greatly increased at European level but that agriculture is still seen on the ground as not very innovative and not necessarily a priority for research.

- **Use the new instruments supporting research and innovation and improve them**: the new European structural and investment funds have provided a range of new instruments for communities to strengthen their innovation policies and systems. These instruments are mainly applied at regional level and prove difficult to use in a cross-border context. There is a need to step-up capacities to exchange. It would be good for example to improve possibilities of cooperation between operational groups, use all possibilities provided by rural development programmes and maybe fine-tune these instruments in the future. There was also a concrete suggestion to include agriculture in the European innovation scoreboards.

- **Improve accessibility of Horizon 2020**: for a lot of applicants, the Horizon 2020 programme is still seen as too complicated, in particular for farmer groups to take part. COPA suggested we ask ourselves how can we make it simpler for farmers to get involved, how we can understand that innovation starts on the farm, how we can better involve national farmers organisations. The multi-actor approach which is implemented in a significant part of Horizon 2020 calls for agricultural research, with an equal status and payment for researchers and farmers should help.

- **Improving the use of past research results**: the conference started with a consensus that research brings results in a time lag of 10-15 years. "*The best way to solve current problems is to look back to what has been done in the past years and try to make the results more widely available*", said Stefano Bisoffi (CREA, Italy). How do you guarantee that results are not lost after the project ends? Institutions have a role to play in this respect. We also need methodologies on how to properly pool research outcomes together. Shared libraries are also useful for researchers. Youssouf Camara from ROPA also raised the need to properly define "exit strategies" for projects: how to make sure advances made during a project stay in place afterwards. This has to be reflected from the early phase or proposal building.

- **Win-win strategies versus trade-offs**: there was an invitation from the audience to focus on win-win strategies. At the same time, the panel also emphasized that this is not always possible and that there are trade-offs. We need to be clearer in our policy objectives at European level: do we want more farms or less farms? Do we want more competitive farms or do we want to decrease the environmental footprint? What is the primary objective? It is not possible always to have it all.

Outcomes of concluding plenary at a glance:

Challenges, or issues needing strengthening:	Implementation aspects needing strengthening
Comprehensive look at agriculture, food and environment. Regional knowledge and innovation systems. Small-holders as key food producers. Metrics on economic, social and environmental impacts. Look at rural and urban actors as well.	Bridge the gap between research and practice through: partnerships, working with extension, assessing the role of private sector and involving them, working with farmers organisations. Improve mutual understanding. Keep simplifying access of farmers to R&I programmes. Allow some form of freedom for basic research. Better articulation from regional, national, European and international levels. Strengthen connection between agricultural policy and R&I, also at regional level. Promote agriculture R&I as something attractive. Define more clearly policy objectives to help adapt research objectives. Improve and fine-tune new ESIF instruments, facilitate cross-border cooperation and exchange of information. Improve use of past research, common pools of research results, shared libraries. Define "exit strategies" to secure results use after projects end.

Closure

Conclusions by Mihail Dumitru, Deputy Director-General, DG AGRI, European Commission

Mihail Dumitru first thanked all those who took part in the conference for their commitment in contributing to shape the path towards future agricultural research. He recalled how important it will be to make good use of the wealth of knowledge and experience produced by the thirty past years of European research. Moving on to the incentives, mechanisms and principles which should underpin the implementation of the strategy, he focused on three main aspects coming out of the discussions: **societal engagement** in research agenda setting, **systems approaches** in agricultural research and **new modes of knowledge sharing and open data**. "*There is wide agreement that societal demand should be the starting point for any research agenda setting. Similarly, society should be given more opportunities to be engaged in research activities and be better informed about research outcomes*" he said. Referring to encouraging examples of successful **interfaces between science, society and policy** presented during the conference, he highlighted the growing interest of people in food and farming practices and invited all to seize the opportunity to enter into a more continuous and open dialogue with citizens. Mihail Dumitru then gave a similarly positive message on how we can **answer the demand for systems approach** in agricultural research, one of the cross-cutting issues already well reflected in the strategy paper. Although complexity may have been seen as a barrier in the past, "*we are increasingly well placed to make sense out of information coming from different disciplines and scales*", he said. Echoing the geographic disconnect between knowledge creation and demand for agricultural productivity increases presented by Phil Pardey, he questioned "*how we can envisage a more fluid circulation of ideas, information and good practices*, *regardless of where knowledge has been created"* and "*how we can make sense of global data and information while considering the site-specific context in which agriculture takes place*". He quoted **interoperability** of information systems and thinking about **business models** for providers and users of the information as potential concrete questions for the future. He announced that, beyond these preliminary remarks, full conference outcomes would be used to finalise the strategy paper by April 2016.

The contribution of agriculture research and innovation to a future Food Research Area – Commissioner Moedas

Closing the conference, Commissioner Carlos Moedas built on the example of his own region in Portugal, where farm innovation is everywhere and where young people are returning to the rural areas. Referring to recent debates on the 4th industrial revolution, he insisted on the important merge between the physical world and the digital world that enables such a dramatic change in how farming is performed. He invited participants to stay committed in developing a **coherent and cross-sectorial European research agenda for food and nutrition security**: the "food research area", to be launched by world food day 2016. "*By coherent, I mean aligned, leveraging funds and with access to data"* he said. He explained data can contribute to measuring progress on nutrition, on sustainability and on economic growth stemming from agriculture. He stressed the importance of interdisciplinary approaches as well. Ending on a quote from Thomas Jefferson "*Agriculture is our wisest pursuit because, it will, in the end, contribute to real wealth, good morals and happiness*", he recalled that agriculture matters and that agricultural policies, including related research and innovation policies, should be designed in close collaboration with the agricultural community.

Conclusions on the core conference questions

How can we be more systemic in our approaches?

Different conference sessions reasserted the imperious need to be systemic in the way we approach research and innovation on agriculture, food systems and rural territories. This means in practice considering all challenges simultaneously (food security, health and nutrition, environmental impact and climate change, growth and jobs creation, demography…) and related synergies and unavoidable trade-offs, seeking to integrate different components of farming systems, value chains and territorial features in a holistic manner, considering interconnections and interdependencies between actors and the role each of them can play in changing the way various systems operate (farmers, up and downstream industry, retailers, people as consumers and as citizens and policy-makers). It also means reintegrating medium to long-term approaches at various stages of the knowledge and innovation process: in anticipating what future questions will be, in designing desirable futures, in designing policies to achieve these desirable futures and finally in deciding how R&I can contribute.

Practical recommendations to be taken into account in the strategy include:

- **Developing metrics and methods** enabling integrated assessments of systems' performance, across **space** and **time**, covering **ecological**, **economic** and **social** benefits. These methods should build on a **wide range of expertise and disciplines**.
- **Assessing what desirable changes would be**, in order to fine-tune policy targets and further specify how research and innovation can contribute to reaching these targets. This requires both **participatory exercises** engaging with society to better define what people want and **increased support to foresight, horizon scanning, scenario-building, visionary thinking**.
- Exploring through **participatory** research **trends regarding the role played by different actors on how the system works**, different **drivers of change** and how they can be used from a policy point of view to achieve change (governance empowering consumers or citizens, labelling, urban food planning, public procurement, valuation of non-economic benefits or natural capital, agro-food policies…).

Systemic research and innovation activities must be geared towards answering common, holistic questions. However, working on answering these questions can involve a **mix of large-scale multi or transdisciplinary projects and of smaller-scale, simpler projects** addressing specific questions, outcomes of all these projects forming together the puzzle of solutions.

How can we work better together at European level?

The conference confirmed there was a general perception that cooperation among Member States and between Member States and European Union activities is very important and has progressed well over the last years. The current set of instruments was considered as good and delivering, enabling synergies, networking and contribution to strategic planning. Examples highlighted the potential of achieving even greater results by connecting different instruments well. Various sessions and speeches highlighted that research and innovation capacities remain however variable from one country to another, with a few countries in the global top-10 in terms of agricultural R&I investments while others have more limited human and financial resources. Those countries with lesser capacities may not be the ones facing the smallest challenges. These differences translate in varying capacities to participate in various instruments available to build the European Research Area, in particular ERANETs and JPIs.

Practical recommendations to be taken into account in the strategy include:

- **Thinking more thoroughly about how to strengthen even more cooperation between Member States in the programming process**, to further alignment and keep reducing duplication of efforts.

- Making greater use of **synergies and complementarities between the different types of instruments** in the toolbox (JPIs, ERANETs, CSAs, COST, ESFRIs etc.), in particular cooperation between different JPIs, cooperation between JPIs and research infrastructures.
- Exploring ways to i) **simplify the most burdensome instruments** (ERANETs) to facilitate implementation, ii) **facilitate participation of a greater number of Member States in European cooperation initiatives**, for example by assessing possibilities to share resources.
- Improving **linkages between regionally-funded, nationally-funded and EU-funded research** (in particular via ERANETs) and between **EU-level initiatives and international initiatives**; using better JPIs as a vehicle for internationalisation and participation in multi-lateral cooperation arenas.

How can we work better together at global level?

Most challenges addressed by the strategy are global and the opening plenary sessions demonstrated the imperative and potential of global cooperation to face these challenges. Phil Pardey illustrated the geographic disconnect between food demand and agriculture research and innovation performance and investment: this **disconnect calls for efficient mechanisms for knowledge exchange**. He showed that Europe, while having world class expertise and research institutes, is no-longer the biggest investor in agriculture R&I worldwide. **Europe should however play a leading role in enhancing international cooperation** on these matters and European leaders speaking at the conference all expressed that ambition. The conference highlighted the **crucial role of research and innovation partnerships**, not only north-north, or north-south but also triangular forms of partnerships "North-South-South". It also highlighted the importance of partnerships between research institutes and organisations such as extension services, private sector advisors or NGOs to enhance farmers' involvement in knowledge creation and speed-up adoption of new practices. Finally, small-holders should be at the centre of research for development and R&I activities should look not only at farmers and rural poor but also at urban poor and urban population as food consumers in general.

Practical recommendations to be taken into account in the strategy include:

- **Investing further in research and innovation partnerships** to solve global issues (including triangular partnerships); multilateral cooperation should come as a complement to bilateral cooperation and not aim to replace it.
- **Exploring novel cooperation mechanisms** such as International research consortia, like the one recently launched on animal health.
- **Develop stronger alliances between different government departments** in charge of agriculture, research and innovation and international development and cooperation, to increase available resources and maximise policy leverage at different scales.
- Considering cooperation with **Africa as a priority,** as well as cooperation on **soil research,** for which concrete ways forward have been identified.

How can we modernize our knowledge and innovation systems?

Several parts of the conference provided insights into how to improve knowledge and innovation cycles and systems and the governance of knowledge in general. Discussions confirmed the need to follow the **interactive innovation model**. This is clearly the case for applied research but basic research - for which there needs to be sufficient room and support-, also needs to anticipate how it could be applied. **Societal engagement** needs to be a priority at all steps of the knowledge creation cycle to anticipate any implementation barriers and secure better understanding, acceptance and applicability of solutions produced. Communication must be improved as well as data management modes and all interfaces in general. There was in particular large interest in the **potential of open data for spurring innovation**. It was suggested that open data should become the default standard, not only to allow for the data to be used but also to increase possibilities to cross data from different sources and disciplines to build innovative applications. The discussion finally touched upon the **science rewarding system** and how to make it fit for impact.

Practical recommendations to be taken into account in the strategy include:

- Fostering an **interactive research and innovation process**, with balanced support to each component of the process, allowing collaborative basic research and translational research to receive sufficient support and freedom, improving links between basic research and applied research and involving practitioners throughout the process.
- Ensuring the process of identifying research priorities **engages** all concerned parties.
- Encouraging **open data and open access as default standards**, by working in particular on interoperability and on business models enabling data and knowledge providers to be rewarded for their work while at the same time making it available.
- Improving **the science-rewarding system** to enhance science delivering for practice.
- Improving **articulation between regional, national, European and international levels**.
- **Keep increasing requirements for inter, multi and transdisciplinary research, multi-actor approaches and integration of social and human sciences**.

How can we make research results fit for policymaking?

More specifically on policies, debates concluded on the need to **strengthen connections between agricultural policies and research and innovation policies at all scales**. Participants perceive that agricultural policy and R&I policy are now much closer at European level but that progress is still possible at national and regional scales. **General policy objectives need to be defined more clearly** for research and innovation activities to maximise their contributions. At European level, a lot of new policy instruments have been created for the period 2014-2020 under the European Structural and Investment Funds (ESIF). There is a need, firstly to make sure these instruments are used at best (to be able to assess them) and then to **improve and fine-tune them**: the audience considered that these instruments are not so easy to articulate so far, and should better allow for **cross-border cooperation**. Networking programmes such as European Innovation Partnership or European Rural development networks can usefully serve as interface between national and European levels and between science and policy. Finally, there is a need to improve what was called during the conference the "**Science-society-policy** interface".

Practical recommendations to be taken into account in the strategy include:

- Using **genuine societal engagement** processes to establish the full societal relevance of research priorities; this should be considered as a continuous process, building on trust, and not as a one-off exercise; the uptake of outcomes in research programming should be secured; more effort should be put in exploring ways of engaging efficiently with society.
- Ensuring alignment of research and innovation activities with societal challenges, their potential impact and contribution to policy goals **at all programming steps** (and not only when defining strategic orientations); anticipating government needs for future policy-making.
- **Boosting communication and outreach activities**, building on better communication and interpersonal skills and on upstream involvement of policy-makers, value chain actors and society.

How can we boost synergies and complementarities between public and private sector R&I?

The opening presentation by Philip Pardey showed that **the private sector plays an increasing role in R&I investments worldwide**, with 44% of global investments, highly spatially concentrated in high and medium-income countries. Several interventions from speakers and the audience also highlighted the role that private companies play in translating research into practical tools for their clients and in providing advice and driving farmers' choices, especially in countries in which the public sector has withdrawn from extension services. The discussion concentrated on cases which justified public funding to private research, on public-private partnerships and on supporting SMEs.

Main conclusions were that public-private partnerships or public funding should be targeted at **enabling R&I outcomes which would not be possible otherwise**, or more costly overall for society. In particular this means developing solutions that would **deliver public benefits along private economic benefits** (public funding for public goods), **limiting intervention in R&I activities for which value added can easily be captured** by market actors (absence of market failure) and **incorporating medium and long-term objectives** as opposed to short-term developments. It was also agreed that public-private partnerships should **build awareness, capacity and knowledge** on both public and private sides, that **dissemination and training activities should be incorporated** and that results should be high quality, competitive at international level and as far as possible **open access**. For this reason these PPPs were considered to be fit mostly for **pre-competitive** research. Although the majority of businesses in the agro-food sector with innovative capacities are SMEs, barriers to participation in these programmes are still too high for them.

Practical recommendations to be taken into account in the strategy include:

- **Promoting SME participation in R&I partnerships** via awareness raising activities, workshops, groupings and organisations, dedicated advice at EU and national levels; explore whether SME support should focus on certain types of innovative SMEs or not.
- **Developing support instruments for public-private partnerships with specific focus on facilitating SME participation**; improving flexibility in terms of project size, duration and partnership composition; exploring ways to combine maximum open access to non-participants without compromising investments from participants.
- Increasing **flexibility in financial instruments**.
- Exploring **mechanisms which could be used to address long-term challenges and public good provision** through **long-term projects** (feasibility of renewable instruments).

How can we better involve farmers in creating and exchanging knowledge?

Farmers' involvement in activities was at the core of the discussion of many of the plenary and parallel sessions. **Knowledge creation and exchange starts in the field and ends in the field** as well: it is therefore important for farmers' organisations that they are involved from the start and considered **not only as 'end-users'** but as **genuine, equal partners** from the early stages of the activities. The multi-actor approach used in Horizon 2020 and in EIP-AGRI projects clearly requires this upstream and genuine involvement and should help achieving progress. Discussion then raised the **crucial importance of working in partnership** with extension services, NGOs, innovation support services, farmers' organisations and the private sector to maximise exploitation of R&I outcomes. This requires **improving mutual understanding** between scientists, farmers and intermediaries, and clearly identifying the complementary skills which are necessary to compose partnerships. In many cases where the agricultural knowledge and innovation system is not so advanced, skills and motivation of all actors need to be improved. Finally, speedy knowledge exchange requires to improve accessibility and use of past research results, through common pools, shared libraries, open data and open access. Information and communication technologies have a great role to play in facilitating interactive innovation processes.

Practical recommendations to be taken into account in the strategy include:

- Maintaining **long-term support to interactive innovation through the multi-actor approach.**
- **Supporting intermediary organisations** which enable networking at various scales and effective peer-to-peer learning, in particular **advisors.**
- Supporting actors in identifying complementary competences.

Appendices

Reports from the parallel sessions

Who attended and list of participants

Other documents available on-line:

Final programme:

http://ec.europa.eu/newsroom/horizon2020/document.cfm?doc_id=12934

Conference paper ""A strategic approach to EU agricultural research and innovation":

http://ec.europa.eu/newsroom/horizon2020/document.cfm?action=display&doc_id=13292

Conference paper executive summary:

http://ec.europa.eu/newsroom/horizon2020/document.cfm?doc_id=13286

Parallel session 1: Adopting a systems approach across farms, value chains and territories

The overall objective of the session was to illustrate how systems approaches can be embedded in research activities, systems being understood at various levels and scales (farms working collectively, landscapes or ecosystems, food systems, territories, circular economy).

Which were the main questions put to the audience?

The overall question of the session was to know how system approaches can be implemented and strengthened in future agricultural research programming and innovation activities? This overall question was further divided into three sub-questions:

- **At a large spatial scale, how can R&I be improved in order to better integrate the different components of the farming systems and the landscape?**

- **How can we better involve diverse stakeholders – including consumers and actors from along the food chain, but also stakeholders in sustainable land use - in R&I activities?**

- **How can we better integrate a medium-to-long-term perspective in today's decision making on developing the agri-food system?**

Short overview of the main elements provided by the presentations

The five presentations addressed the dynamic interactions of the different components of production systems in two directions: horizontally across the space (farm, landscape, territory, cross-national) and vertically along the food chain.

- **Unlocking the agricultural system: the example of agroecological research and innovation systems** - Philippe Baret provided an overview of the main challenges faced by agricultural systems (right to food, equity and sustainability); the diversity of pathways to meet these challenges (particularly stressing the trade-offs between productivity and sustainability, between economy and ecosystem); and the innovation needed to implement them (shifting from actions by farmers at plot level, to multi-actor approaches at system level).

- **A systems view on below and above ground interactions in agriculture: small organisms driving big innovations** - Katarina Hedlund illustrated how applying system-based research helps to understand the complex interactions in the plant-soil system, which are the primary drivers of production. A system approach helps to deal with the threats caused by agricultural intensification and leads to a sustainable production. Introducing/valuing Natural Capital into the farmers business could help to promote land manager's decisions.

- **Agroforestry systems: complexity underpinning multiple benefits from the farm to the landscape** – Paul Burgess showed how integrating trees in farming can increase on-farm complexity but also produce multiple benefits when based on a collective management at landscape scale. Trees are a common feature of European agriculture and it is therefore vital that they are recognised in production, planning, policy, and research. There are projects like AGFORWARD and Agr'eau which are working with farmers and other stakeholders to develop profitable and sustainable systems at farm- and landscape-levels.

- **Putting the farm in the context of its region and value chain** - Hugues Vernier gave the inspirational example of the benefits of long-term (30 years) multi-actor cooperation in rural areas. He presented partnerships between producers, consumers and policy makers in Southern France based on a common vision (e.g. scaling up organic farming) which served to create regional value chains and support rural development.

- **What role for consumers and consumer involvement in food production? Demand as a driver of sustainable and competitive farming systems and value chains** - Moya Kneafsey illustrated the increasing trend of consumers trying to shape sustainable food systems, as response to the lack of transparency (e.g. unclear labelling, food fraud) and growing awareness of problems in the current food system (e.g. ethical and environmental issues). However, global and local food chains are interlinked and it is not always a straightforward case that 'local' is always more sustainable than 'global'. This is one reason why labelling for sustainability is tricky. Also, the influence of labels is limited because consumers often do not read them; routines, habits, price, and scepticism about labels also play a role in shopping decisions. The ability to purchase according to personal values is not evenly distributed in society. Increased engagement of "food citizens" is leading to new partnerships between producers and consumers, such as Community Supported Agriculture (CSA) and short food chains reconnecting cities and regional farming.

What important factors or issues emerged?

At a large spatial scale, how can R&I be improved in order to better integrate the different components of the farming systems and the landscape?

We currently look at the simple value chain approach by measuring the individual parts of the system (soil fertility, yield, farmers' revenues, consumer demands). A research priority is to look at how these different parts of the system can be integrated on a large scale in order to achieve a sustainable society. For this we need to identify which metrics and methods link the parts of the system in space and time. We need methods that are able to assess multi-cropping systems, i.e. to capture ecological and economic values. The ecosystem services approach that links the agro-ecosystem to the social system seems a valuable concept. In addition, it is not only new assessment methods, new metrics, but also the integration of disciplines and various types of knowledge that should help to progress. A wider societal debate is encouraged on what food and farming systems should deliver (e.g. health, nutrition, fair deal for farmers). Increasingly, citizens are requesting to be more involved in the governance of food. Finally, we also need to recognize that the food system alone cannot solve inequalities in access to healthy, quality food: policies such as on health and welfare are influencing consumption patterns too.

How can we better integrate diverse stakeholders – including consumers and actors from along the food chain, but also stakeholders in sustainable land use - in R&I activities?

Presentations and discussions highlighted the importance of better integration of a diverse range of stakeholders across the food chain through participatory approaches: farmers, advisors, processing industry, retailers, consumers, policy makers. Systems based research on agro-ecosystems generally applies multidisciplinary, transdisciplinary and multi-actor approaches and could serve as an example. 'System wide projects' generally have a broad scope and extend from science to policy and innovation. But there is also a need for more targeted research that responds to specific needs. The challenge is to develop a comprehensive research strategy that allows for integration of the various components of systems and their interactions at different scales. It requires a strategic sequence of individual research questions that answer in their totality to a broader question. To succeed, individual projects need to work closely together and seek to develop synergies.

Research should take into account the latest trends by which consumers are actively influencing sustainable food systems. An example is Community Supported Agriculture (CSA) where citizens are involved in the governance of food systems or the rise of food policy councils (at global level) that are reconnecting cities and regional farming. These new types of agriculture represent a specific market niche in terms of quality and price and have specific research and innovation needs. Retailers play a key role in shaping production, demand and consumption. Value distribution along the food chain is not even. Research and innovation should contribute to enabling structural changes that increase the share of the farming sector in food chain added value.

How can we better integrate a medium-to-long-term perspective in today's decision making about how to develop the agri-food system?

Phil Pardey stressed at the conference opening the imperative need for long term approaches. The research cycle takes 50 years from the creation of new ideas to their adoption. Changing mentalities, shaking up the system is not easy and requires bringing new people on board and new ways of thinking. It takes time to show that solutions work, as shown in the presentation of a 30-year long term local cooperation of the Biovallee project (FR). The research challenge is to anticipate future needs, e.g. providing answers that are relevant in 50 years' time. For example is the crop demand mainly driven by local/EU consumer needs or rather by global drivers? How do we target our research today in a range of possible future scenarios? To respond to these types of questions more investment is needed on horizon scanning as well as long-term and large scale visionary thinking

What concrete actions did the group recommend?

The group recommended to:

- provide more support for system approaches, multi-actor, multi-scale and multi- and trans-disciplinary research and innovation.
- include land-use planning in research on agro-systems, taking into account ecosystem services to define trade-offs between environment and economics.
- Undertake research on how to overcome sectorial approaches and better deal with conflicting policy objectives to support policy coherence.

Can you tell us about heavily debated questions on which there was not consensus and need to be taken forward? Were there any suggestions on how to take them forward?

The following questions were raised during the discussion:

- **How to integrate large scale, potentially more intensive agricultural production and more local small and medium systems?** Is it a conflict or co-existence? We need to consider the trade-offs between productivity and sustainability, between sustainable intensification (classic pathway with less environmental impact) and agro-ecology (based on principles, moving from field/plot to the overall system on the farm), shifting from maximization to optimization. Sustainable intensification is very context related, e.g. in the western world it is about reducing inputs.

- **How to better account for the various market and non-market values of organic farming systems?** Currently, markets do not reward farmers for delivering a range of ecosystem services that do not have a market value. Instead, they risk that their marketable outputs are lower due to the reduced use of external inputs. Assessing the value of Natural Capital may help as a method to promote the organic farming. Include in research work on environmental economics to design models that help diversify farmer income, i.e. by delivering ecological goods in addition to the production of market goods.

- **Can consumers lead production systems?** Consumers who behave more and more as "global citizens" are facing dilemmas. The different ways to measure sustainability make it difficult for consumers to decide what to buy: e.g. Carbon label versus organic versus local or fair trade – what is 'best'? Labelling is important but not the only way to drive sustainable food production systems. Context, routines, prices and processes are highly influential. The financial and practical capability to purchase according to personal values is not evenly distributed in markets. More could be done in the realm of public procurement and urban food planning to enable citizens to express demand for sustainable and ethical food products (including community food production).

- The concept of systems thinking needs to be further clarified to be applicable to the agri—food sector in different situations. This implies that we are aware of the boundary conditions of systems, a main factor being consumer demand. To which extent can policies help to shape consumer demand or to increase freedom of choice?

Parallel session 2: Achieving better together: fostering synergies among Member States and with European Framework Programme

Given the importance of challenges faced by food systems, delivery of research and innovation in the EU implies that synergies are fostered among Member States and with the EU. So far Joint Programming Initiatives and European Research Area NETWORKS (ERANETs) have been the main vehicle to achieve this but they could be complemented with other approaches and tools. The discussion was meant to investigate how to scale-up cooperation. It also aimed to tackle the issue of joint research infrastructures.

Which were the main questions put to the audience?

The main questions structuring the session were:

- Activities implemented jointly with Member States in Horizon 2020 are mainly through ERA-NETs although new instruments are 'piloted' (International Research Consortium model - like the IRC on animal health- and European Joint Programme Co-fund on One-health) and several JPIs are developing various types of coordinated activities. **To contribute to ERA building and with the aim of fostering synergies, which direction should be taken, what cooperation format would be best suited and how to move towards this?**

- FACCE and HDHL are the most important JPIs in Societal Challenge 2. H**ow should Horizon 2020 articulate activities with these JPIs so as to speed up synergies and alignment/integration of research and how to move towards this?**

- **How can we deal with the potential issue of deepening integration / alignment of research and the need to involve as many Member States as possible in Horizon 2020 activities and how to move towards this?**

- **What types of infrastructures are most necessary (hard, soft, …)?**

Short overview of the main elements provided by the presentations

Four presentations covered different types of instruments or initiatives:

- **Joint European Programming:** Niels GØTKE presented the experience and main achievements of the FACCE JPI. He recalled the structure of the JPI, its priorities and recent developments including the Strategic Research Agenda and the implementation plan. In conclusions and lessons learnt, he highlighted the importance of **connections between different instruments**. JPIs are a way to build the ERA. They can be very helpful if they help to use in the most efficient way the **whole span of other types of instruments** (ERA-NETS, CSA, EJP, COST, Marie Curie, ESFRIs). Also cooperation between different JPIs is important as well as public/private cooperation. Finally JPIs can be a vehicle for internationalisation and multilateral or bilateral partnerships.

- **ERANETs spearheading European research coordination**: Based on the example of ICT-AGRI, Raymond KELLY illustrated how ERANETs can deliver practical outcomes. He presented the process followed from mapping research activities to defining a strategic research agenda and funding joint calls for projects. He insisted there again on **partnerships** and on the role of ERANETs in i) **valorising regionally or nationally-funded research projects** in a European or even international context, ii) fostering **cooperation between different disciplines**, **scales**, **government departments**.

- **Strengthening European infrastructures**: Abad CHABBI presented the example of ANAEE, a joint infrastructure on ecosystems research. He illustrated how research experimental infrastructures could be a way for Member states to jointly address a common challenge and, in the case of ANAEE, global risks. He illustrated well there again the connections between different types of instruments, in this case the link between JPIs and ESFRIs. He also mentioned the international dimension of the activities.

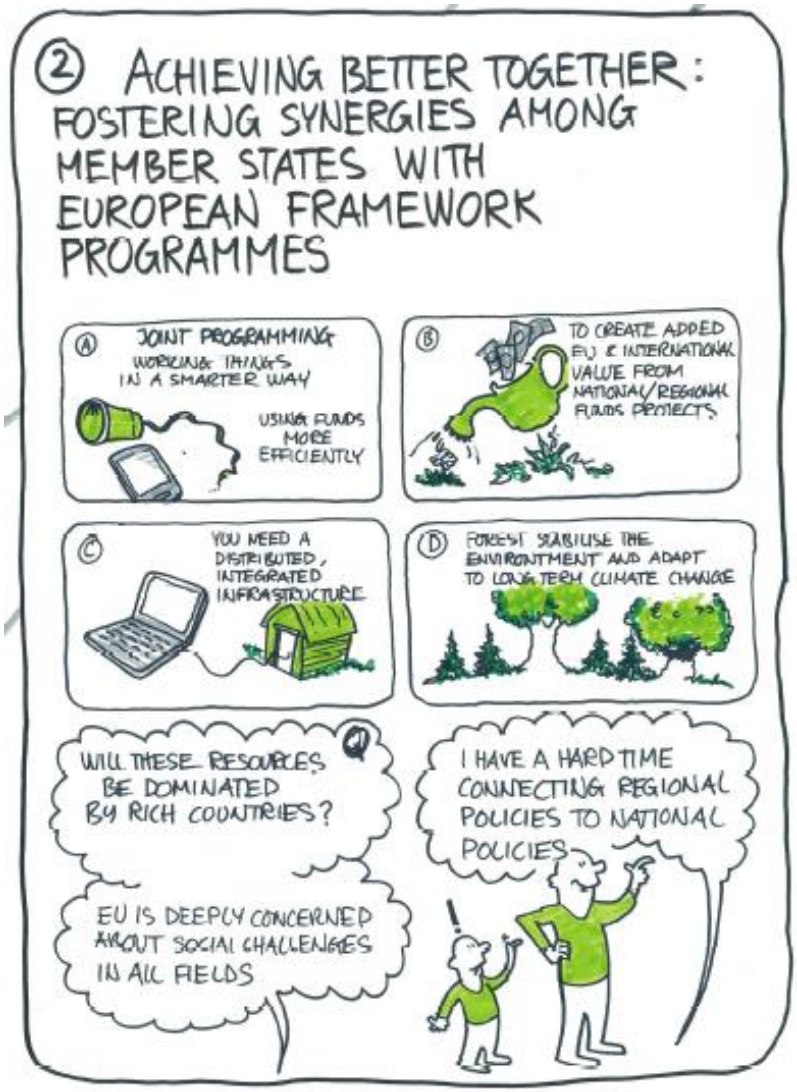
- **Cooperation in conservation and use of genetic resources**: Michele BOZZANO, from Bioversity International presented the experience of common work from Member States on conservation and use of forest genetic resources. He presenting the shortcomings of actions undertaken individually by each Member State of genetic resources conservation and the added value of concerted approach, which enabled building joint methodologies, minimum common requirements, shared understanding and better strategy making as a result.

What important factors or issues emerged?

All initiatives that were presented involved a huge number of partners. They conducted a lot of interesting and strategic research and innovation activities with a strong cooperation dimension and comparing their achievements is interesting. Overall, there is a general perception that **cooperation among Member States at EU level is important and has progressed**, which is a positive sign for the European Research Area.

The audience considered that all equipment and instruments which currently exist are delivering. They are **strengthening synergies between Member States to create networks and do strategic planning**. They are engines to create concrete projects. Although better connections are needed with SMEs, we can see that this dimension also already exists.

Regarding 'soft' and 'hard' types of infrastructures or ERA-NETs or other co-funded cooperation instruments, the session highlighted difficulties and disadvantages for some people or small countries: they lack in particular human resources to participate in a wide range of activities. Also financial capacities are not sufficient to participate in a multitude of initiatives.



What concrete actions did the group recommend?

The session recommended however **to think more thoroughly about how to strengthen even more cooperation between Member States in the programming process**. As shown in the presentation, the instruments are good but the challenge lies in improving coordination and synergies between them.

With regard to difficulties in integrating member states with more limited capacities in activities, the discussion suggested **analysing how to share money contributed by the various countries to these initiatives**.

The challenge overall is to strike the right balance between inclusive partnerships which can involve a maximum number of Member States and integration and alignment of research agendas, with always the objective to avoid duplication of work.

Participants highlighted also that large initiatives need **good governance and management** and this can sometimes lead to difficulties. The discussion suggested in particular that ERANETs can be burdensome administratively and reduce their attractiveness. Ways to reduce this administrative complexity could be explored.

Finally, as many issues handled through the European research Area address global challenges, the group recommended also **improving linkages between EU level initiatives and global initiatives**.

Can you tell us about heavily debated questions on which there was not consensus and need to be taken forward? Were there any suggestions on how to take them forward?

There were no additional questions beyond those exposed above.

Parallel session 3: Setting the right conditions and incentives for knowledge creation & sharing.

The session was invited to discuss how to set the agenda for all research activities (from basic to applied), set the priorities for funding and delivery mechanisms in order to ensure that knowledge that is needed in the long run is created at an adequate moment, shared and contributes to advancing policy goals. The session was also asked to address the need for collaborative joint research on areas of high priority and the need to maintain a strong focus towards innovation.

Short overview of the main elements provided by the presentations

The five presentations covered:

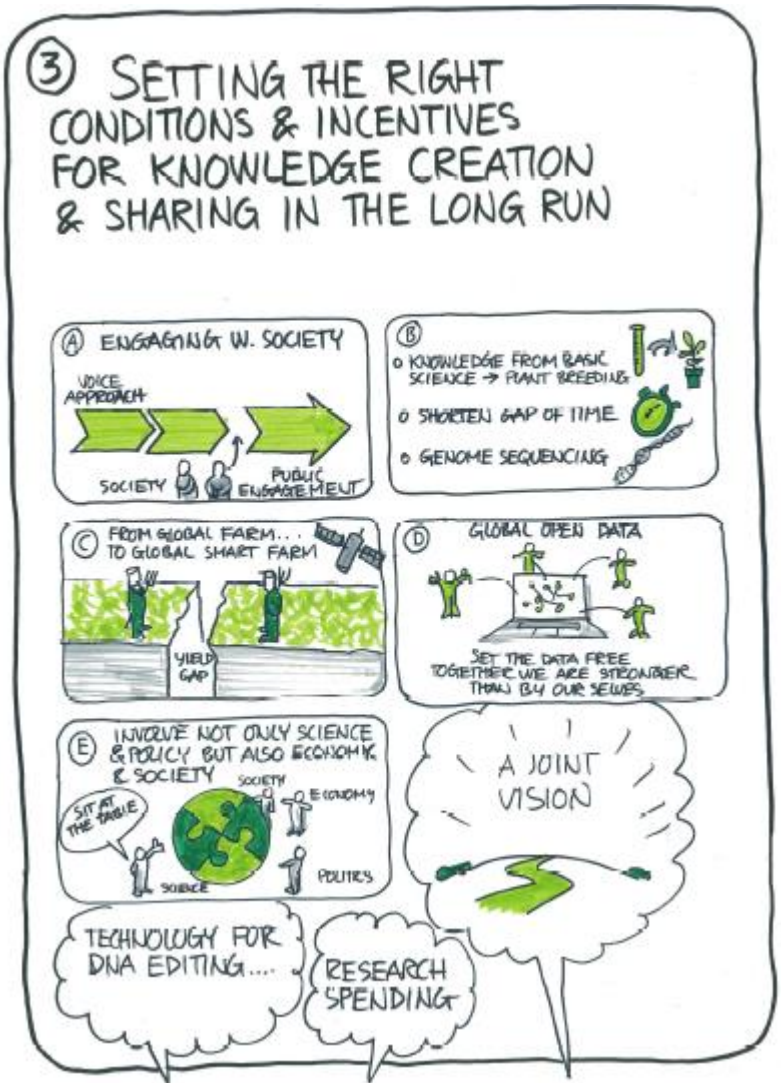
- **public engagement in research agenda setting**: how the Voices project on urban waste had mobilized citizens, developed a methodology to involve citizens and captured citizen input to develop a research agenda; in doing so it had bridged the implementation gap between science and practice; but even so, the citizen conclusion on the themes most needing research were not subsequently fully included in R&I activities programmed afterwards;
- **bridging the gap between basic research and applied research**: how basic plant science was a crucial element in catalyzing new thinking in plant breeding; and the need to consider ways of accelerating basic science themes of potential importance to the creation of, for example, disease resistant crops;
- **integrating different disciplines**: how novel ways of knowledge generation emerged from cooperation between different disciplines (based on the example of integration of digital technologies and Earth Observation with many agronomic and environmental sciences) and actors, leading to promising site-specific, smart farming enhancing productivity and sustainability; highlighting the importance of interdisciplinarity, transdisciplinarity and the need for data to be open and accessible and for people to be equipped with knowledge empowering them to use this data;
- **improving data sharing and data management**: the governance lessons to be learned from a global open data network initiative, enabling knowledge sharing – making data available, meaningful and accessible; focusing on interoperability; defining goals and impact; remembering sustainability; the need to reflect on rules and business models that could enable greater sharing of data while also allowing data providers to be recover the costs of data production; considering the social and human dimension of transitions needed;
- **the importance of the "science policy society" interface:** including how research conclusions succeed or not in influencing policy; and whether policy drives the research agenda sufficiently not only with regards to strategic orientations but also concrete research activities which are funded; the presentation went on to describe German Agricultural Research Alliance (DAFA) – one approach that helps to create (a) coherent joint strategies, (b) new forms of participation involving society and economic actors in research policy and research planning already from the beginning, (c) better communication, (d) procedures to monitor implementation and real progress, and (e) ultimately better long-term understanding.

What important factors or issues emerged?

Before any research starts there is a need to **bridge the "implementation gap"** by using prior public engagement to establish the full societal relevance of research priorities; in addition, wherever possible the science should **anticipate government needs** for future policymaking. Public and government engagement needs to be scientifically sound, engaging properly representative focus groups rather than relying on questionnaires. Engagement should be seen as a continuous process and **not as a one-off exercise** and the **uptake of outcomes should be secured**.

Then, while the research is under way, **communication with stakeholders is crucial**. That raises the profile of the research among relevant sectors of society; and researchers should listen to any responses, in particular to anticipate any barriers to implementation of the potential conclusions.

Final conclusions need to be pushed out to the whole community – with a view to encouraging action. Those leading food chain research projects, for example, need to ask themselves "*If the tools and open data are available for "smart" farming, why are many farmers slow to become smarter?*" It may be that researchers need **better communications skills**; and involving a range of farmers in research project design should lead to outcomes that make enough sense to **persuade farmers to act**. It may also be that the developed solutions are still not adequate and as user friendly as they should be. Providing Big Data streams of the Copernicus satellites for example is only a starting point. We also need **algorithms, and easy accessible information and knowledge platforms as supporting instruments**.



Basic research needs to clearly anticipate how it will be applied, implying that an appropriate relationship between basic and applied research is important. In some cases, looking to accelerate the pace of basic research delivery will be necessary so that urgent applied research can proceed expeditiously. In prioritization, it is important therefore to engage potential users of new knowledge and beneficiaries, to explain not only the applied research but also the basic research that may be needed first.

Several interventions suggested that **open data should become the common default standard** not only to allow for the data to be used but also to increase possibility to cross data from different sources and disciplines to **build innovative applications**. This requires removing obstacles which are linked to human and social and economic issues rather than technical issues.

Research often starts with "issues", and then explores the data available before exploring how it that data can be applied and with what impact in partnership networks. In a changing world, however, there is a need to be **more open to new ways of knowledge generation, knowledge sharing and knowledge governance**.

What concrete actions did the group recommend?

Arising out of the factors discussed, the group recommended research funders and providers to:

- move from a linear approach to **a research and innovation cycle composed of basic research, applied research, advice, and innovation**; ensure that there is a balanced support of each component mapped over time and across the collaborative projects (in particular to meet the need to strengthen collaborative basic research and translational research);
- **ensure that the process of identifying research priorities engages all concerned parties** – in other words not only the research institutions looking to tender, but stakeholders able to provide a view of the societal challenge beyond the purely natural scientific resp. afterwards in the position to implement future research findings in regional/national policies in order to meet societal challenges effectively, and those who it is expected will act differently in the light of the research outcomes (society, businesses, governments); secure long-term partnerships in this respect to build an efficient science-policy-society interface;
- **make sure the alignment with societal challenges, the potential impact and contribution to policy goals is checked at all programming steps** (from strategic orientations – which are generally well aligned- to design of specific calls for projects);
- **encourage open data and liberation of private and public sector data** to serve as basic elements of all research programmes by setting the right rules and business models that allow data providers to recover their production costs (e.g. allowing the private sector to add their own value in approaching potential commercial customers);
- **commission a peer review of public and private sector big data sources** and their availability and capability of use in research;
- **use its significant contracting power to discourage over-possessive researchers, and reward contributions to outcomes**, rather than papers published or models designed;
- **research the factors which mean that farmers of different characteristics, foresters, landowners and rural communities generally do not draw enough on research outcomes** that would help them achieve better outcomes from their land and other resources. Which research models best inspire action on the ground?
- **commission work exploring ways of engaging local communities in a long-term process** - using real participatory exercises addressing the *overall* resources needed to address future challenges, so that people can assess single issues such as genetic modification in their wider context; secure the uptake of the outcomes of these engagement processes;
- **encourage outreach activities in the various sectors** to promote wide sharing of the latest research findings and challenges – for example by working with the organisers of events such as "Fascination of Plants" day and "Open farm Sunday" and making suitably designed core resources available for easy use;
- **explore the potential of game playing to engage Europe's younger audience** – for example by arranging to put real data into something like a merger of Farmville and Simcity - so that the challenge is to explore ways of making the best use of land and rescuing the real global food system rather than future fantasy worlds.

Can you tell us about heavily debated questions on which there was not consensus and need to be taken forward? Were there any suggestions on how to take them forward?

No issues were raised that led to a heavy debate; the contributions were all recognized as having considerable merit.

Parallel session 4: the Global dimension: fostering the contribution of EU research and innovation towards global challenges through multi-lateral cooperation

Participants to this session were invited to discuss how the external dimension of the agriculture research and innovation strategy can be implemented, for instance how to foster efficiency at global level on the basis of examples of approaches which could be used in future programming, how to integrate global frameworks on development or food security or climate.

Which were the main questions put to the audience?

The EU Strategy on agricultural research and innovation has many inextricable links to the global agricultural research and innovation community, among these are:

- at the broadest level stewardship of the planet, its **finite natural resources**, and the need for **sustainable and inclusive growth and development**;
- **interconnectedness** of global food markets;
- tackling impacts (positive and negative) of agriculture on climate change;
- managing risk, particularly of plant and animal diseases which respect to borders;
- contributions EU agricultural science and innovation community can make to the global community and benefits to be derived there from.

The main questions addressed were the following:

- We face many common global challenges that go beyond production. Opportunity for rural youth is a major global challenge. What can Europe offer and learn in using agri-food innovation to create opportunities?
- What are the requirements and responsibilities of good partnerships in international actions in tackling mutual challenges? How to ensure networked actions are equitable, efficient and adding value?
- How do you see the role of EU research funding in engaging with international networks and initiatives?
- A number of international initiatives encompass research, implementation and policy making. What is needed in practice to make these linkages work?
- How would this strategy benefit from African experiences?

Short overview of the main elements provided by the presentations

Four presentations provided contributions to these questions:

- **Contribution of the strategy to cooperation with Africa –Yemi Akinbamijo:**

The five areas of the EU Strategy (i) resource management (ii) healthier plants and animals (iii) integrated ecological approaches (iv) new openings for rural growth and (v) enhancing human and social capital in rural areas are well aligned with the continental agricultural development plans (CAADP) Science Agenda for African agriculture development promulgated by the Forum for Agricultural Research in Africa (FARA). Also the modalities through which collaboration were in place. In that context FARA would serve as a key facilitator for engagement with the respective sub-regional research fora (CORAF, ASERECA, CARDESA).

- **SCAR-ARCH: fostering the impact of agricultural R&I – Patricia Wagenmakers**

The African and European Partnership on feed security was described and discussed in terms of its scope and achievements. Similar R&I partnerships could help derive full collaborative benefits while implementing the new EU Strategy. Based on the experience gained, seven recommendations were offered: (i) start with a need(s) (ii) be aware of platform dynamics and build trust, confidence and capacity (iii) work jointly on innovation (iv) brokering is essential (v) aim for benefits for all (vi) recognize and include the role of the public sector and (vii) use flexible instruments.

- **FACCE JPI: international soil research: opportunities for cooperation –Maurice Heral**

The presentation covered the importance of soils as critical natural resource and the links to (i) greenhouse gas trade-off among food production, biodiversity conservation and ecosystem services, (ii) water use efficiency and reduced water pollution and (iii) mechanisms for carbon sequestration. Among the actions that are being pursued and should be expanded under the new strategy are (a) development of indicators to track progress on the issues mentioned above, (iv) development of global hotspot for carbon sequestration and (c) understanding functions of biodiversity.

- **STAR-IDAZ: international research consortium on animal health –Alex Morrow**

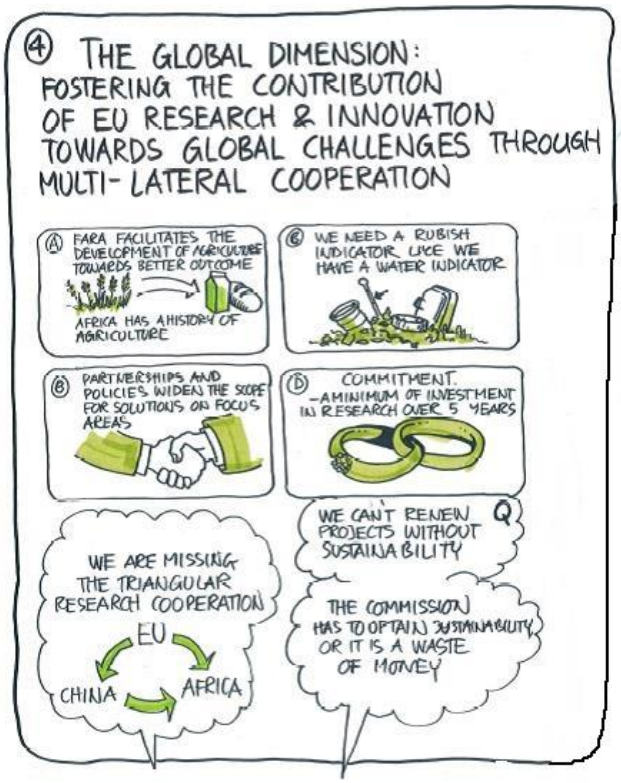
A number of infectious diseases have afflicted both people and livestock over the past two decades, and billions have been spent controlling them. Time series data show that such infectious diseases, some with pandemic potential, are emerging or re-emerging with increasing frequency. The objective of the emerging STAR-IDAZ international research consortium is to build a global strategic alliance for the coordination of research to control such infectious diseases. The consortium has identified 30 priority diseases and issues and will work with 16 partners in 12 countries to develop vaccines, diagnostics and other tools and critical scientific knowledge for their control.

What important factors or issues emerged? What concrete actions did the group recommend?

Participants reaffirmed the **enormous potential of global collaborative research and innovation** partnerships such as the ones discussed above and others which may be subsequently identified as the EU strategy is implemented. These collaborative partnerships are indispensable to **leveraging the global agricultural knowledge community** to **solve some of the most compelling challenges** that stand in the way of attaining global food and nutritional security. However, participants also expressed the view that such partnerships **could not and should not supplant all bilateral relationships**.

Participants also expressed the view that a stronger alliance among European Commission's Directorate generals for Agriculture, Research and Development could help to strengthen such global collaborative alliances by increasing the resources available and maximizing political and policy leverage at the community and global levels.

These global collaborative partnerships should be built in such a way as to **create real national and regional ownership of the work being done**, pay attention to **subsidiarity principles** and to **sustainability**, not of the alliances per se but of the work being done.



Parallel session 5: fostering synergies and complementarities between public and private research

Participants to this session were invited to discuss how European framework and national programme resources can be best used to foster synergies and complementarities between public and private research to deliver on current challenges. Possibilities offered by different types of instruments and approaches were reviewed.

Which were the main questions put to the audience?

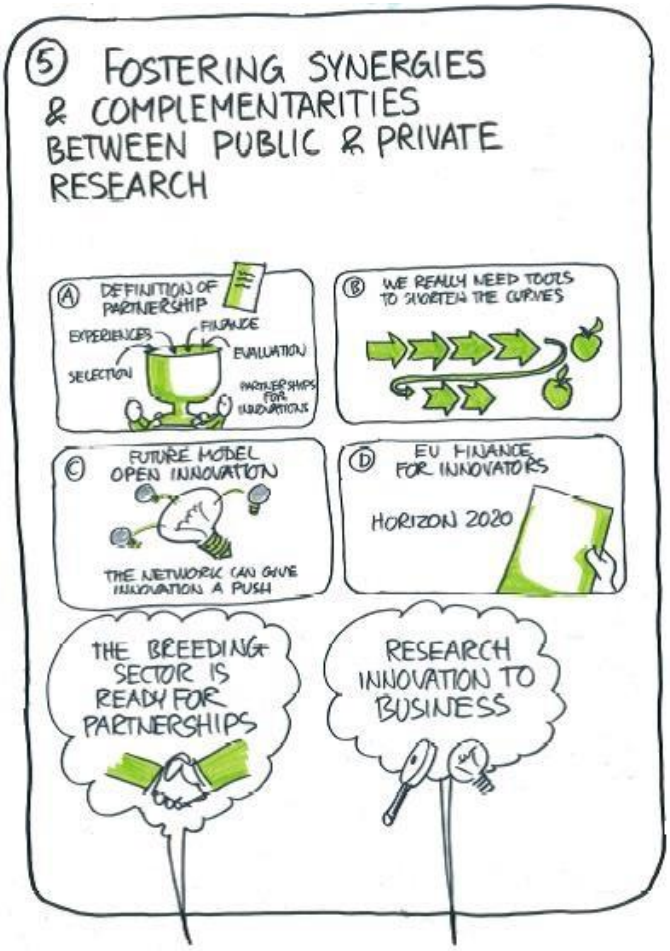
The session aimed to address 2 main questions:

- Having in mind the 5 priorities within the draft agricultural R&I strategy, what are the areas or steps in the innovation chain that have the biggest potential or need for creating synergies and complementarities between public and private research?
- Which kinds of enabling environment and partnerships are needed to best foster synergies and complementarities? Do we have the right instruments at appropriate levels (regional/national/EU/international) or could other instruments be envisaged? How to best cater for the needs of SMEs?

Short overview of the main elements provided by the presentations

The four presentations provided:

- **the perspectives and experience of the OECD in supporting Public Private Partnerships (PPPs)**, with observations on project selection, management and evaluation, financing mechanisms and on the potential for adding valued from public/private partnerships;
- **the experience of the successful 7th framework programme project "Fruitbreedomics" with broad public/private participation** which had delivered clear added value and stakeholder impact in terms of public goods as well as increased capability and competitiveness for the participant companies;
- the experience of a national project, **Food for Health Ireland**, in which a **consortium of large competitor food companies has partnered with university partners** in pre-competitive research projects to deliver results with health and welfare advantages for consumers and clear leverage and synergy from public / private co-investment;
- **the presentation of InnovFin**, novel financial instruments under H2020, with specific relevance for stimulating more private investment in research and innovation.



What important factors or issues emerged?

Public/private (R&I) Partnerships (PPPs), are an essential tool and important in ensuring the fit of publicly-supported research & innovation (R&I) activities with sector needs and optimal use of resources. They should be targeted at enabling **R&I outcomes which would not be possible without partnership**, or more costly. Furthermore, they should **build awareness, capacity and knowledge on both sides**. They can fill gaps where underpinning basic science cannot be taken-up by industry without public/private cooperation. They are **most appropriate for pre-competitive R&I** and for supporting **medium and longer-term objectives**, and the R&I activities should clearly be **shared** between partners. Science and development activities supported must be of **high quality and competitive at international level**. Evaluation and monitoring must be performed before, during and after project activity. Dissemination and training activities should be incorporated and as far as possible (pre-competitive) results should be **open access**.

It was generally agreed that it is often **difficult for SMEs in the agri-food sector to participate in PPPs**, for a series of reasons, including limited manpower, financial and infrastructure resources. However, these are partners with much to offer, with clear needs for R&I support and a major component of the sector. It is a therefore a priority to further encourage SME participation and to develop **flexible instruments adapted to the reality and diversity of agri-food SMEs**.

What concrete actions did the group recommend?

Most concrete actions proposed centred on the need to **promote SME participation in R&I partnerships**. There is a need to further raise awareness of the different programmes and initiatives available for funding of public/private R&I collaboration. In particular, this should target SMEs, which have less time or capacity to look for funding opportunities than large companies and public organisations. This should include activities at national level such as **workshops targeting individual SMEs**, and **relevant groupings and organisations**. Related actions proposed were a **dedicated advice centre at EU level for SMEs** to provide information on support instruments available and to direct SMEs interested in developing or participating in partnerships to national representatives also specifically charged with assisting SME participation.

The development of **support instruments for public/private R&I partnerships with specific focus on facilitating SME participation** was proposed. These should have maximum flexibility in terms of **project size, duration** (allowing medium and longer-term objectives) and **partnership composition**. It may be that SMEs are best served by participating as associations of individual companies and this option should be explored. **Increased flexibility in financial instruments** is also needed, with the possibility for significant subsidy levels and examination of alternatives such as **participation in equity by funding agencies**.

Can you tell us about heavily debated questions on which there was not consensus and need to be taken forward? Were there any suggestions on how to take them forward?

No strongly contentious issues emerged during the discussions, but two specific questions were raised for further discussion:

1. Many R&I goals addressed by PPPs require **long-term projects** (*e.g. developing breeding tools/pre-breeding germplasm in long-cycle crops as woody species)* – **what mechanisms can be used for such projects – are "renewable" instruments a possibility?**

2. It was agreed that **PPPs should be encouraged as far as possible to produce public goods and to disseminate results** – how is it possible to **combine maximum Open Access to non-participant stakeholders without compromising the investments and expected returns for the active participants?**

Another issue was whether SME support for participation in PPPs should **focus on certain types of innovative PPPs** (start-ups) or should also include SMEs which are not traditionally active in research.

Parallel session 6: Interactive innovation: the role of different actors in delivering knowledge and exploiting it at best

The objectives of this session were to discuss when and how to best involve actors and end-users upstream and downstream to capture practical and tacit knowledge; foster knowledge exchange and incentivize interactive innovation and co-creation and finally assess where this is most needed, how to get actors to engage and which methods and instruments should be privileged.

Which were the main questions put to the audience?

The main questions were:

- **What is the motivation of actors and end-users to get engaged in interactive innovation projects such as multi-actor research projects and thematic networks?** (discuss the motivation to get engaged per different category of actors - researchers, farmers, advisors, enterprises, etc.)
- **Which instruments and methods can incentivise this engagement?** (e.g. knowledge exchange events and tools, networking instruments etc.)
- **Why is there a need for interactive innovation projects bridging the gap between research and practice?** E.g. (1) improve the applicability of the research results by inclusion of tacit and practical knowledge, (2) incentivise the motivation of end-user to apply the generated solutions, generate co-ownership, (3) as an effective means to intensify dissemination by using the dedicated (existing) end-user channels, (4) to capture bottom-up innovative ideas from practice, etc.

Short overview of the main elements provided by the presentations

Five presentations covered the following aspects:

- **Main outcomes of SCAR SWG AKIS 3** (A. Vuylsteke): Farmers are partners instead of end-users as they are producers of knowledge and "drivers of ideas". There are many instruments in the AKIS, but in this context more synergies and improved linkages are needed. Policy should stimulate cross-overs with other sectors (food and other bioeconomy-related sectors). More efforts are needed to enhance explicit links between knowledge systems and education systems. The presentation also raised the importance of Information and Communication Technologies (ICTs) on the development of AKIS in the future, likewise governance issues related to ICT and big data should be explored.
- **Experience of a multi-actor project:** Marjeta Čandek-Potokar made a very comprehensive presentation providing the different steps for a real involvement and development of a multi-actor approach. She highlighted the importance of interaction between partners, as well as the need for shared efforts to reach common goals, with the common interest as a bonding factor. In order to build a real interactive multi-actor project it is key to recognise the potential of the different actors.
- **The role of intermediate organisations to support interactive innovation**: Dr. Hanns-Christoph Eiden talked about the importance of intermediate organizations to support the interactive innovation system and the different networking levels needed to develop the activities. Interaction needs to be organised at small scale (matching partners in around concrete project ideas) and at a big scale (e.g. through seminars, workshops etc.). He highlighted that there is no innovation without interaction; it is about breaking up big challenges into smaller concrete issues, and about bringing together a group committed to find a solution.

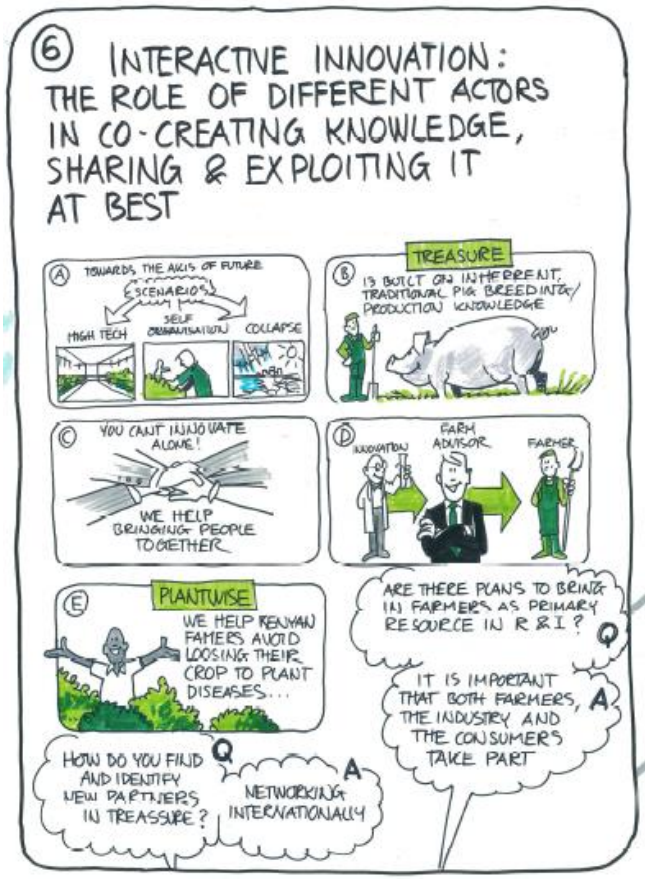
- **The role of advisors and extension services as innovation catalysts and multipliers**: Tom Kelly explained how advisors valuably contribute to the productivity and sustainability of the farms. The advisor role is switching from instructing to facilitating. They also should provide a continuous feedback to the research programme on a multi-annual basis. He mentioned discussion groups as an effective tool for knowledge exchange, applied for more than 15 years in TEAGASC with more than 14000 members (farmers).

- **Plantwise knowledge Bank in Kenya**: Willis Ochilo gave an overview of an innovative approach to knowledge dissemination and creation, with the Plant Clinics operating in the plant sector as the Clinics for humans. He emphasized in particular the relevance and importance of ICT in this context, both as a way to help interactive innovation processes and as a way to identify further research and training needs.

What important factors or issues emerged?

The following issues emerged as important:

- The need to support the actors to **identify complementary competences** and the recognition of their potential, the need for talking the same language, of having common interests and same objectives and confidence to build a co-ownership process.
- Innovation is not just about knowledge transfer, it is about many different factors related to the rather innovation-friendly character of the whole system. .
- ICTs may help the interactive innovation process, allowing a continuous feedback to research and training.
- The interactive innovation process is also enabled by the contemporary role of advisors as facilitators, fostering knowledge sharing through peer-to-peer learning processes.



What concrete actions did the group recommend?

The group recommended **long-term support to foster innovation**. In this regard, there is a need to continue supporting the interactive innovation model through the multi-actor approach even if it can evolve during the implementation as it is a process of learning by doing. Multi-actor projects are seen as the best tool to face the challenges ahead.

The group also highlighted the importance of **intermediary organizations** like the ones presented by Dr Eiden, that **enable networking at different levels** and also the linking to different other instruments (E.g.: H2020 projects and ERA-Nets). Also persons playing the role of intermediary, such as advisors are crucial for further development of the interactive innovation process in the agri-food sector, in particular via the development of discussion groups increasing capacity of peer-to-peer learning.

Finally, participants recommended supporting actors in identifying complementary competences.

Can you tell us about heavily debated questions on which there was not consensus and need to be taken forward? Were there any suggestions on how to take them forward?

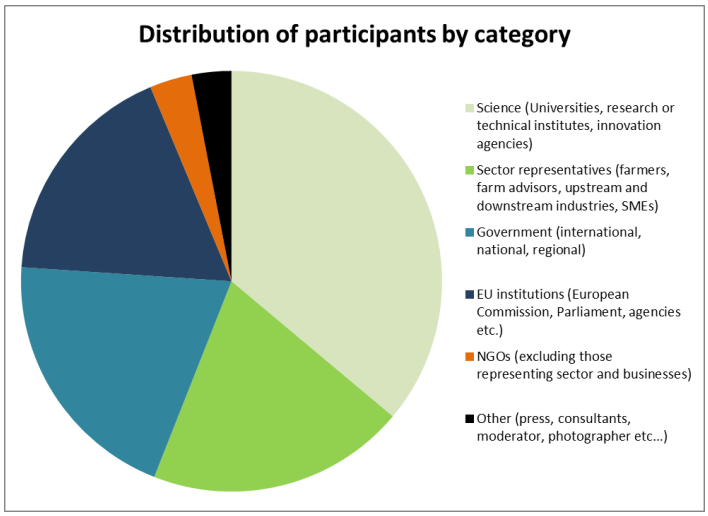
Two main questions emerged:

- **How to change the way to produce and reward scientific knowledge for practice?** It is recognized that the scientific rewarding system is not working in this respect. The current system also fails to harness and digest the scientific information produced. We need to look for a rewarding system for researchers performing research of relevance to the sector. While practitioners need practical solutions, researchers are expected to pursue "excellent" scientific publications.

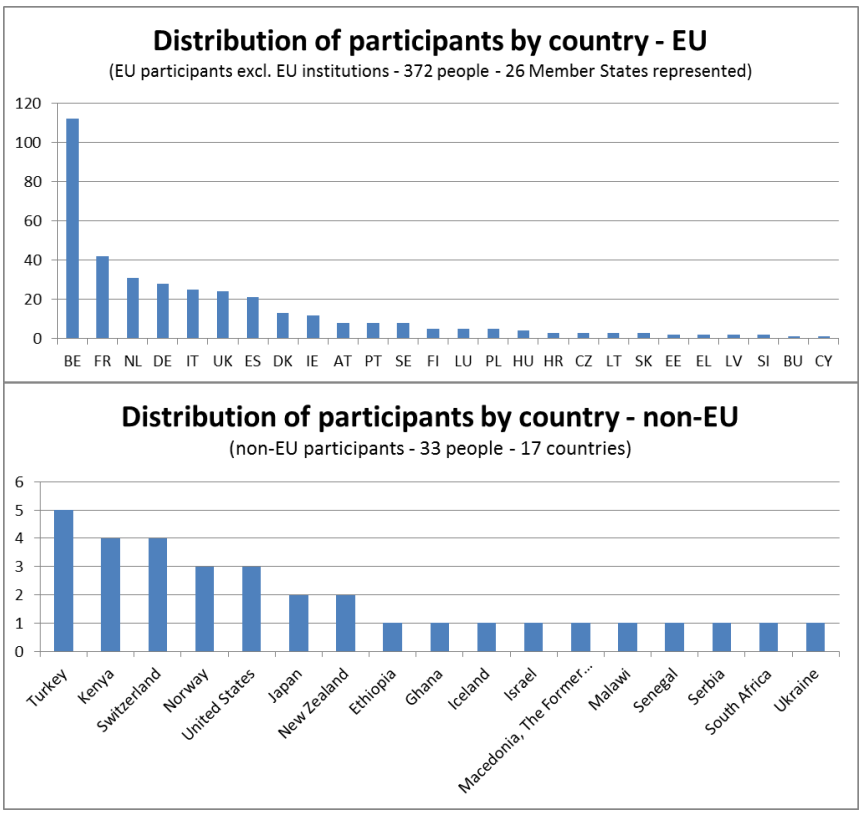
- **How to strengthen the multi-actor nature of projects? How to lift the disconnect between needs for and the funding of research?** In this regard the group felt that actors who are currently not sufficiently involved in research and innovation mechanisms (mainly end-users/ driver of ideas) needed to be better supported and prepared. Farmers are not only "end-users" of knowledge but also have the potential to buy in and take ownership of research activities right from the start. Changing attitudes is necessary. Also, researchers must go more often to farms and understand better the real knowledge needs of agriculture and forestry. Mechanisms for capturing knowledge needs from practice and building a realistic knowledge agenda should be put in place.

Who attended?

The conference assembled 493 participants representing a variety of actors involved in science, agriculture and forestry and related food and non-food supply chains (upstream and downstream industries and retail), as well as non-governmental organisations representing wider types of interests (environment, animal welfare, development), officials from European Union institutions, international organisations (FAO-GFAR, OECD, FARA, CIHEAM, CGIAR) and national and regional governments. Participation was open to all those interested with approval by European Commission. Science and government participants (EU and others) each represented a little above one third of the participants. Sector and business representatives and NGOs represented 25%.



Forty-three countries were represented, including **26 EU Member States** and **17 non-EU countries**. Distribution of participants between countries is represented below:



42% of participants were women. The full list of participants is available here.