SIXTH FRAMEWORK PROGRAMME

Structuring the European Research Area Specific Programme

RESEARCH INFRASTRUCTURES ACTION

Contract for an

ACCOMPANYING MEASURE

implemented as

SPECIFIC SUPPORT ACTION

"Report on the scientific content of the Success Scenario Workshop"

Project acronym: **FOREINTEGRA**

Project full title: **Integrating Foresight in Research Infrastructure Policy Formulation**

Section 1: ForeIntegra Project Background

Research infrastructures (RIs) play an increasing role in the advancement of knowledge and technology and their exploitation, and are at the core of research and innovation processes. In a European context, by offering unique research services to users from different countries, including from the peripheral and outermost regions of Europe, by attracting young people to science, and through networking of facilities, research infrastructures help to structure the scientific community and play therefore a key role in the construction of an efficient research and innovation environment. Because of their ability to assemble a 'critical mass' of people and investment, they contribute to national, regional and European economic development. They are therefore at the core of the knowledge triangle of research, education and innovation.

Given their importance, a key objective of the European Union's Seventh Framework Programme (FP7) for Research and Technological Development (RTD) is to optimise the use and development of the best research infrastructures existing in Europe, and to help to create in all fields of science and technology new research infrastructures of pan-European interest needed by the European scientific community to remain at the forefront of the advancement of research, and able to help industry to strengthen its base of knowledge and its technological know how.

At the same time, there are limitations as to what can be achieved at the European level, and Member States remain central in the development and financing of infrastructures. In the case of many Central and Eastern Europe (CEE) countries, RIs have been degraded over time and are in need of major new investments. Moreover, the manner in which RIs are used and managed could be better optimised, whilst researchers from these countries should also be granted greater access to state-of-the-art facilities in other parts of the European Union.

How such arrangements might be developed and operationalised is the focus of the ForeIntegra project. ForeIntegra is a one year FP6 SSA-project that aims to introduce and test Foresight approaches in the context of RI policy and strategy formulation. Foresight refers to a set of forward-looking, deliberative processes that aim to foster appreciation of future opportunities and threats in a decision-making context. Such processes are widely used within public and private sector organisations, as well as by national governments and the European Commission, where the aim is typically to identify strategic research and innovation policy priorities.

Accordingly, the objectives of ForeIntegra are as follows:

(a) To conduct a pilot Foresight exercise in the Agri-Food / Biotechnology RI domain, with particular focus upon CEE countries, using a 'success scenario' workshop approach

(b) To elaborate recommendations for a more extensive use of Foresight approaches in RI policy and strategy

(c) To develop guidelines for conducting further Foresight activities in support of RI policy and strategy

The project's main activities are centred on the pilot Foresight exercise. An initial step has involved the conduction of desk research and identification of several important 'drivers' of change with implications for RI policy and strategy in the agri-food / biotechnology area over the coming 10-15 years. This has been done through an extensive literature review and discussions with a group of twenty or so experts (the ForeIntegra Expert Panel) drawn from a wide range of European countries.

The data and insights generated were used as a basis for discussion in the Budapest 'success scenario' workshop. Scenarios are plausible and coherent pictures of the future. They are used not to predict the future, but rather to expand the 'possibility space' on how the future might unfold. As such, they offer possible views of the world, providing a context for decision-making. By seeing a range of possible worlds, decisions should be better informed and a strategy based on this knowledge and insight is more likely to succeed.

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Section 2: Scenario Workshop on Research Infrastructures

Aims and Description

The Success Scenario Workshop of 1.5 days was held in Budapest and organized by the Institute of Economics, Hungarian Academy of Sciences (IE HAS). The organizational work was entrusted to IE HAS while the development of the methodology of the workshop was carried out by PREST.

The workshop brought together all members of the Expert Panel to consider the implications of the baseline scenarios for the future of the RI domain under study. Participants prepared a Success Scenario intended to include:

- a desirable and at the same time feasible vision of the future for the given RI domain in 2020, and
- a series of action points in the form of a basic policy roadmap**.**

The success scenario, as well as the set of baseline scenarios, may form the basis of future proposals for Community support under the Research Infrastructure Action in FP7 and its funding schemes for Integrating Activities or Communication Network Development.

Following the workshop, the recent report was developed by the coordinator, covering the scientific and policy content of the workshop. The process of producing and using scenarios (futures) is as important as the scenario stories themselves. Building and using scenarios is about asking questions and not just providing answers. Thus, the process is intended to widen our perspectives, helping us to understand issues and events as significant that we might otherwise dismiss as unimportant, or just not see at all.

With this in mind, a group of leading experts in the areas of agri-food biotechnology and RIs – the so-called ForeIntegra Expert Panel – was gathered for a workshop in Budapest to discuss and deliberate on future RI needs within a 2020 time horizon.The specific objectives of the workshop were as follows:

(a) to review and discuss a set of drivers of change that are anticipated to have major implications for agri-food / biotechnology RI in the coming 10-15 years;

(b) for workshop participants to develop their own ‘success scenario’ or ‘vision’ for future developments in European RI (and in NMS and CC in particular); and

(c) for the workshop process to begin to build an “advocacy coalition” around this shared vision of success (and its associated policy measures), in the hope of increasing it’s likelihood of implementation.

The steps in the workshop process were as follows:

After listening to a small number of **scene-setting presentations**, the Expert Panel spent a little time reviewing the drivers identified by the ForeIntegra project team and discussed a vision of agri-food recently articulated within the remit of the SCAR Foresight exercise.[1] On this basis, the Expert Panel identified (a) important agri-food / biotechnology research directions, (b) measures to support research in the area, and (c) the implications of (a) and (b) for future RIs.

[1] See http://ec.europa.eu/research/agriculture/scar/index_en.cfm?p=3_foresight for further details.

In a **second part of the workshop**, a number of drivers of change specific to RIs was critically reviewed and discussed by the Expert Panel. These covered aspects of funding, management, access and use of RIs, and also took account of the special conditions present in CEE countries and the European dimension. However, the main activity in this second phase was to assemble a matrix of agri-food / biotechnology RIs. The Expert Panel engaged with this matrix, with a view to identifying a 'future space' that is both desirable and realistic as a target for future developments to aim at.

In a third and final part of the workshop, this 'future space' – essentially a vision of success for agri-food / biotechnology RI developments over the next 10-15 years – was further elaborated. In particular, the Expert Panel identified the steps needed for the vision to be realised. In light of such considerations, concrete policy actions and recommendations were articulated that aid the step-by-step process of vision realisation.

- **About scenarios:** Scenarios are plausible and coherent pictures of the future. They are used NOT to predict the future, but rather to expand the 'possibility space' on how the future might unfold. Importantly, scenarios encourage us to think about the measures we need to take today to shape the future we want tomorrow.

Workshop Inputs (scene-setting presentations)

1. *Facts and Figures on Agri-Food Sector / Biotechnology in EU and CEE (A)* – Summary of the Desk Research e-mailed in advance to the Expert Panel
2. Draft List of Agri-Food / Biotechnology Drivers (Discussion A) – Power Point Presentation (PPT)
3. Draft Agri-Food Vision (Discussion B) - PPT
4. Draft List of Key Research Directions (Discussion C) - PPT
5. Draft List of Research System Characteristics (C) - PPT
6. Draft List of RI Drivers (Discussion D) - PPT
7. Draft List of Agri-Food RI (Discussion E) - PPT
8. Menu of Likely Funding Sources for RI (F)
9. Menu of Possible Policy Actions (Discussion I) – PPT

Workshop Logic and Process

The key input of the workshop was the knowledge (tacit and codified) held by the workshop participants. The process was organised around various stages feeding subsequent ones. Each stage included activities moderated/revised/reviewed by working groups. The ground rule was to follow the proposed methodology; however, everyone was absolutely free (and encouraged!) to debate the content of the material and visions provided.

Figure 1: Workshop Flowchart for Day 1

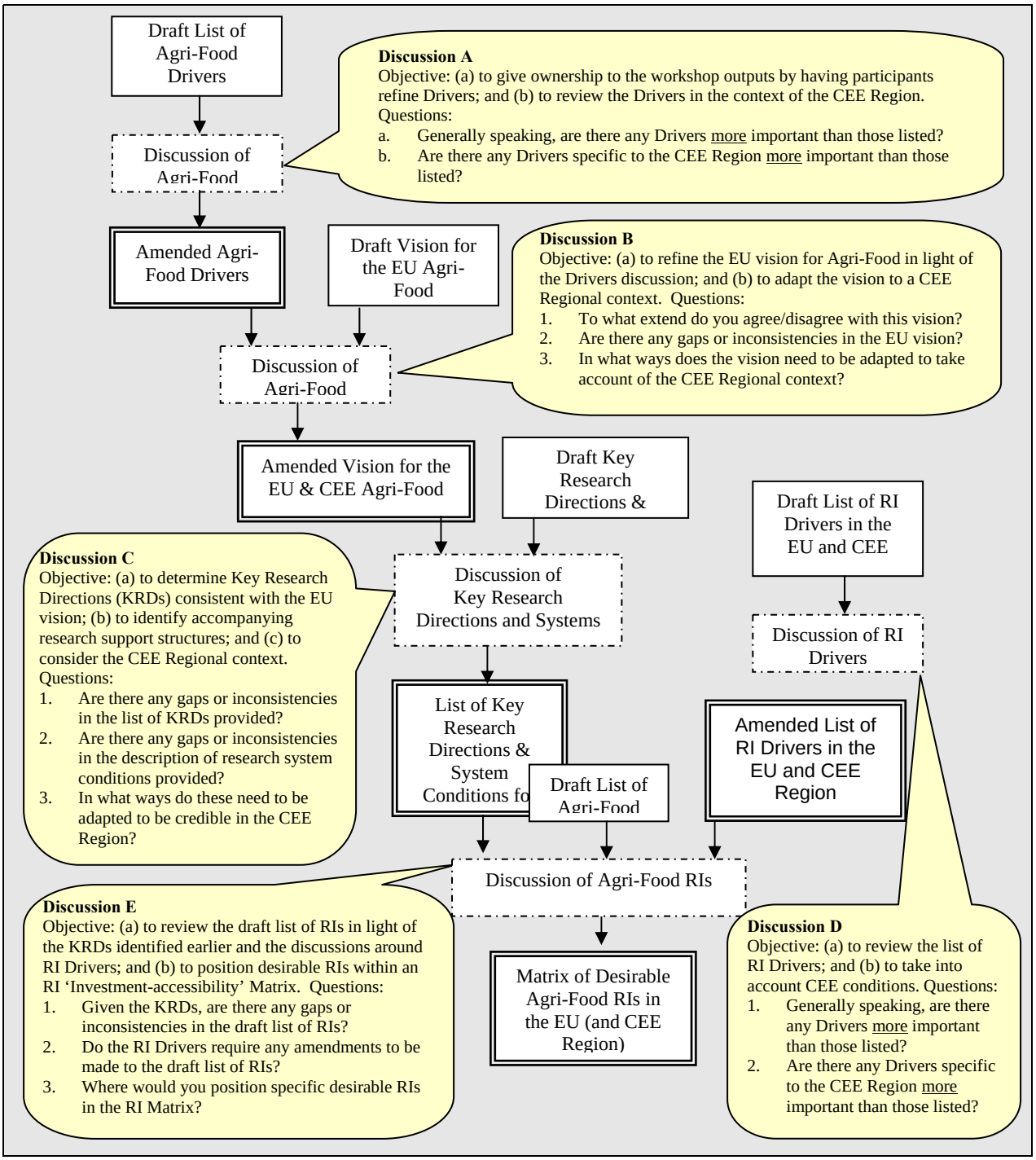
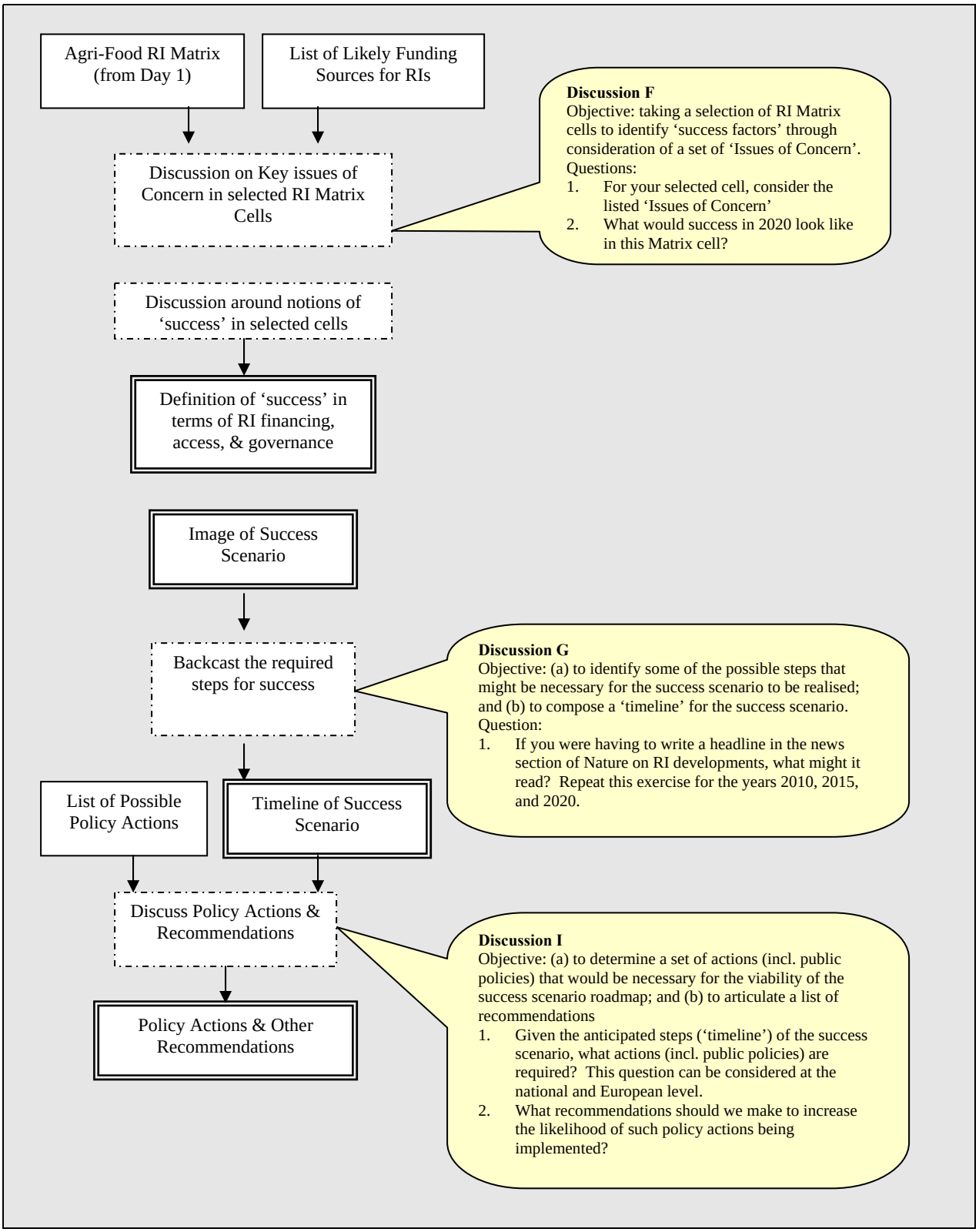


Figure 2: Workshop Flowchart for Day 2



Section 3: Key outcomes of the Budapest Scenario Workshop on RIs

This section presents the key outcomes of the Budapest Scenario Workshop on Research Infrastructures. It is important that the reader bears in mind that the ForeIntegra Project is only looking at research infrastructures in the Agri-Food sector. The workshop outcomes have been structured around subsections which reflect the overall results of the discussions at the workshop. (For detailed notes on each discussion, please see annexes).

Main drivers of the Agri-Food sector

The Agri-Food sector is major contributor the EU economy and involves a wide range of stakeholders – from farm producers to food consumers. Several interdependent sub-sectors are linked to the Agri-Food sector, some of these are: the **agriculture** sector (producing and distributing agricultural products); the **food** sector (improving the way in which food products are produced, preserved, packaged and delivered to the consumers); and the **biotech** sector (undertaking research on and applying new technologies to crops and animals in order to enhance the agriculture, health and pharmaceutical sectors, among others). With these in mind, the workshop participants considered several drivers for each sub-sector (see below).

Agriculture Drivers

- **Political**
  1. Common Agricultural Policy (CAP) reform
  2. Governance and other organizational issues (e.g. land ownership and land reform in the CEE region)
- **Socio-economic**
  3. WTO and trade liberalisation
  4. Increasing demand for wider diversity of products
  5. Need for better diagnosis of new, emerging and re-emerging diseases
  6. Evolution of macro-drivers such as employment, interest rates, urban-rural dynamics relations, genetic diversity, technology developments in areas outside agriculture
- **Health & Ethics**
  7. ‘Fork-to-Farm’ thinking
  8. Animal welfare concerns
  9. ‘Food-feed-fuel’ (bio-fuels in competition with food production)
- **Environmental / Natural**
  10. Climate change
  11. Environmental / Biodiversity concerns
  12. Increasing problems of animal infertility

Food Drivers

- **Political**
  1. Increasing regulations on Food quality in terms of food authenticity, specificity (linking food production policies to the respective businesses)
- **Socio-economic**
  2. Existing agendas on food research
  3. New food consumption behaviours
  4. Restructuring of the Food Industry (new business models)
- **Health & Ethics**
  5. Food Safety Concerns
  6. Increasing Link between Nutrition and Health
  7. Securing food as ensuring access to food on global basis

Biotech Drivers

- **Political**
  1. EU legislation and the Cartagena Protocol on Biosafety
- **Socio-economic**
  2. Availability of Skilled Human resources
  3. Nanotechnology and convergence technologies
  4. Increasing influence of multinational companies
  5. Developments in new Reproductive technologies
  6. "'omics" technologies, bioinformatics and bio-radiation
  7. IPR issues (cost of patenting, confidentiality of results), especially in the CEE region
- **Health & Ethics**
  8. Public Acceptance of Biotechnology

Towards a vision for Agri-Food (A-F) Research in the EU

In order for Europe to have a competitive and sustainable agriculture the A-F sector must be:

- profitable/competitive;
- adaptive to climate and other environmental changes;
- capable of meeting safety and health concerns – such as the 'fork to farm' principle; and
- sustainable in all respects – environmental, economic and social..

Therefore, the Agri-Food systems should be diversified broadly in three systems:

a. A world market competitive sector operating on a large scale for food and other products, i.e. resources for other sectors and industrial red/blue/green/white services of the knowledge-driven bioeconomy

b. Smaller scale production with shorter, more transparent food supply, often with organic farming, closer interaction between agri-food and consumers and less burden on environment

c. Producing public goods (landscape, environment, biodiversity): tourism & social outputs

The A-F sector includes not only consumers and producers but also food manufacturers and retailers, the financial infrastructure and research. The food processing industry is adding value to agricultural production and therefore is an important actor in research and innovation. Retailers currently squeeze the sector with negative consequences for manufacturers and growers.

The sector must act with social responsibility. A dialogue between society and the sector involves the public taking responsibility for its lifestyle choices. Europeans are refined consumers.

Governance reform is key to the future of the sector – to include better articulation between the EU and national level and regional communities/citizens– involving all stakeholders who have the knowledge to implement policies in this sector. We also need flexibility of policy – recognising that one size does not fit all and that Old Member States tend to drive the EU policies in the sector.

Innovation is the key need – must question the need for new research when there is a large body of unexploited existing knowledge that could be configured to support solutions to key problems in the sector. This demands a specific knowledge infrastructure that can deal with tacit/traditional knowledge as well as codified knowledge (which can be disciplinary and reductionist). The key rationale for research becomes facilitating access to knowledge through creating absorptive capacity and providing an entry ticket to the knowledge community.

With respect to the knowledge infrastructure each nation is creating it separately but none provide the next step for creating an innovation economy. We need a serious commitment to knowledge brokers rather than basic research. Applied research is also neglected.

The A-F Vision for the CEE countries should also consider that:

- The A-F industry in CEE countries must be convinced that innovation is essential for the competitiveness and survival of companies in the agri-food dynamic sector.
- The region needs better relations between consumers, researchers and industry – at present research completely separated from industry.
- Subsidy is necessary to preserve local diversity/taste of food – some typical products already disappearing.
- There is a need for reform of production systems and better logistics.
- For agriculture a large scale farming producing cheap reliable products is needed.
- There is also opportunity for organic farming.
- The needs of the rural community have to be considered - linked to social policy.
- The CEE region also has an asset in potential exploitation of genetic resources – using gene banks for preserving biodiversity
- In CEE region the distinction between traditional (tacit) and codified knowledge has to be considered – need to get balance right between moving more towards transfer of codified knowledge, getting beyond word-of-mouth to use e-infrastructures for sharing knowledge among farming communities.

Key Research Directions and Research Systems

The expectation is that research will be driven by multiple rationales including agendas emerging from the research community itself, from business and other users, and from communities and citizens.

The criteria for each of these sectors will be different. For science, the standard peer review considerations are applied (novelty, excellence, competence and composition of team, and availability of facilities). For business/user-oriented research, the agenda is problem-driven and solution-oriented. Novel ideas are still welcome but the main aim is to meet regulatory requirements/ standards and to support wealth creation and hence the sustainability of the business. Selection must be changed to favour multidisciplinary approaches (also to be reflected in education). The citizen-oriented agenda is determined by citizen involvement and dialogue and to long term public goods that would not be funded by industry.

Specific research areas emerging in a **science driven research system** are mainly concerned with understanding of principles underpinning various fields – these include bioscience on a molecular level, nanotechnology research, modelling of climate and environment, principles of diseases in animals and crops and transmission to people, animal psychology/behaviour, mapping biodiversity, consumer sciences and psychology.

In a **business/user-oriented research system** the agenda depends on the needs of the sector and is very specific; so we may look at broader challenges. We always need full set of academic disciplines to understand problems, to find solutions, so we must escape the provincialism of traditional agronomic disciplines – research should be multidisciplinary.

The **citizen-oriented research system** would consider an agenda driven by topics such as public goods biodiversity/ leisure/ informal economy. The long term public interests are not addressed by food and plant industry. These are long-term health /sustainability; healthy and tasty food and affordability; strategic capacity preservation; cheap and healthy basket of food and sharing with neighbouring countries; tacit knowledge use and preservation; finding alternative income and opportunities for farmers; the implications of the precautionary principle relating to hazards and anticipating highly disruptive events; consumer dynamics; and achieving the same or higher level of production by using less inputs at lower costs.

Research Infrastructure (RI) Drivers

S&T needs

- Better response to the EU scientific community needs: both bottom-up and of state-of-the-art facilities but diversified and fragmented at different levels.
- CEE to catch up in achieving higher quality in research considering the global competitiveness in science
- Better response to emerging scientific fields, transdisciplinarity of research fields (i.e. biotechnology, nanotechnology, etc.) and opportunities for convergence in S&T developments (bioinformatics, biofuels)

New Drivers and considerations:

- RIs to consider the need to attract young researchers and recruiting them
- RIs to consider the long term financial sustainability issue that is closely related to S&T needs – interfacing with other needs (other scientific fields, society demands) so that RIs remain financially sustainable, for instance contract research etc.
- RIs to increase proximity to end users and shared space in geographical and spiritual terms

Technical needs

- More emphasis on security and sustainability of RI
- Increased need for easy-to-use and better access to RI (unique / distributed / virtual)

New Drivers and considerations:

- Upgrade of existing RI by creating new technical capabilities to extent knowledge and improve RI operation
- Verification of RI feasibility in terms of economic efficiency, public interest and avoiding overlapping

External / Structural needs

- More efforts towards transition programs and ways of exploiting EU funds (facilities, resources, tools), Structural funds, FP7, etc.
- Demand for creating / adapting common EU27 / global RI standards
- Demand for new / better integration of RI services to meet consumer/market demands
- Development of stronger industry agendas (e.g. Monsanto) since industry also demands graduates familiar with the latest infrastructures

New Drivers and considerations:

- Response to long-term needs (preservation of the biodiversity, longevity of the data base; energy and food crises)
- Improved harvesting of research results and exchange of information (information and communication infrastructure needed to make use of databases)

Specific for CEE:

- Increased efforts towards preservation of genetic resources
- Long term monitoring of climatic and environment changes
- New emerging diseases
- Ongoing industrial policies

Research Infrastructure Needs (Investment-Accessibility Matrix)

Investment Required	Accessibility			
	Local	National	CEE Region	EU
> €5M				
€0.5M - €5M				
< €0.5M				

As summarized in the previous discussion RI have to respond to diverse set of S&T, Technical and External needs such as consideration of the long-term challenges (biodiversity preservation, longevity of the data bases, energy and food crises, emerging zoonoses, financial sustainability, etc.), effective and flexible response to EU community demands on agri-food services and global competitiveness in science in terms of human resources development, research agendas and facilities' upgrade.

Research Infrastructure Success Scenarios

Four segments with more international orientation were chosen for development of the three Success Scenarios. The key issues of concern were discussed regarding their future-oriented support and operation - governance and ownership, funding, variety of uses and users, human resources, etc. The resulted 'Images of Success' were used as starting points for backcasting a timeline from the future to the present (years 2010, 2015 and 2020), with the aim of identifying possible steps to the realisation of the Images. The Scenarios were designed as headlines in the news section of Nature on RI (see landscape pages below).

nature

(*ForeIntegra Success Scenarios* as 'vignettes' in the news section of Nature magazine by 2010)

A 5.5 million euros laboratory complex has been opened to house the headquarters of the new Alert System for Plant and Animal Diseases (ASPLANDI) for the Central and Easter European (CEE) region in Poland. CEE-ASPLANDI is an ambitious initiative lead by the European Commission (EC) with the main purpose of preventing and controlling plant and animal diseases in the CEE region of Europe.

(See full story below…)

The first of a series of monthly meetings between agro-food scientists and policy-makers has taken place in Brussels.

The meeting is part of an ongoing effort to improve communication between the scientists and policy-makers in the wake of growing concerns about food safety as well as animal and plant diseases in Europe.

(See full story below…)

EUGENE began in 2007 as a consortium supported by the EC, several national governments, research organisations, firms and NGOs. From its creation it aimed at becoming a non-profit, self-financing entity, generating income through services used by companies & other research units.

At first, EUGENE focused on upgrading & expanding existing infrastructures.

(See full story below…)

EU builds new Alert System for Plant and Animal Diseases (ASPLANDI) in the CEE region

A 5.5 million euros laboratory complex has been opened to house the headquarters of the new Alert System for Plant and Animal Diseases (ASPLANDI) for the Central and Easter European (CEE) region in Poland.

CEE-ASPLANDI is an ambitious initiative lead by the European Commission (EC) with the main purpose of preventing and controlling plant and animal diseases in the CEE region of Europe. ASPLANDI is expected to reach 30 million euros upon completion of Phase 3 in 2020. The costs for ASPLANDI have been shared between various stakeholders concerned about food security and health in Europe, the CEE region and neighbouring countries. The EC funded **Phase 1**, which required 0.5M euros for consensus building activities to reach political commitment and 1M euros call for designing the project. However, the 5.5M euros of **Phase 2** were shared between the EC (30%), the Polish Ministry of Health and Social Security (10%), the Polish Ministry of Agriculture and Food Economy (10%), the Polish Agency for Restructuring and Modernizing Agriculture (10%), FAO (10%) and the remaining 40% through a grant of the European Regional Development Fund. The headquarters hosts two major facilities: a Plant Diseases Lab (PDL) and a high containment Animal Diseases Lab (ADL). Poland was proposed by Spanish experts in the field due to the country's strategic geographical location and the important role of the agricultural sector, among other factors. **Phase 3** of the Alert System involves the creation of multi-site nodes in other CEE countries in order to gather regional data and carry out experiments with common standards and protocols. It is envisaged that the creation of the nodes, related networks and knowledge exchange platforms in CEE countries as well as the other eleven New Member States (Cyprus, Latvia, Czech Republic, Lithuania, Slovak Republic, Estonia, Malta, Slovenia, Hungary, Bulgaria, and Romania) will require additional investments of around 2M euros per node. It is also expected that after 2020 ASPLANTI will function as a buffer possibly outreaching beyond EU to Ukraine, Russia, Kazakhstan, etc.

Ongoing activities at the headquarters are oriented toward training and knowledge management in order to help CEE countries to catch up with good practices in plant and animal disease prevention, diagnosis and control.

ASPLANTI Timeline

2007	2008	**Now (2010)**	2020	Beyond 2020
• Reaching political agreement on headquarter' s site • Identifying existing networks where such a discussion could take place e.g. Chief Vet Officers – Chief Plant Officers • Stimulating existing ERA-NET and creating one on RI	• Design Phase • Lobbying national sponsors in the headquarter' s country	• Building HQ facilities • Buying HQ resources and tools • Linking HQ activities to other similar centres/labs in Europe, such as EFSA (EU), CISA (SP), AFISA (FR), LINHOLM (DK), PIRBRIGHT (UK), LEUJSTAD (NL) and RIEMS (DE), for example. • Training and knowledge management courses on plant and animal disease prevention, diagnosis and control	• Building 11 nodes with the support of national governments and regional agencies • Operationalising a rapid info-system, alert system with fast response to both plant and animal diseases	• Outreaching beyond EU to Ukraine, Russia, Kazakhstan, etc. through cooperation and extra-EU nodes
• 0.5M euros	• 1M euros	• 5.5M euros	• 22M euros	• …

Science & Policy Dialogue on Agro-Food (SCIPOD-AF) deemed success

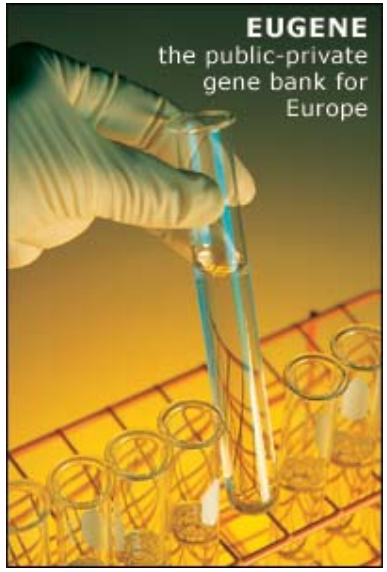
The first of a series of monthly meetings between agro-food scientists and policy-makers has taken place in Brussels.

The meeting is part of an ongoing effort to improve communication between the scientists and policy-makers in the wake of growing concerns about food safety as well as animal and plant diseases in Europe. While the language of science is a global the language of policy-makers needs to consider both national and global regulatory frameworks. Having this in mind, two networks (one on agro-food policy and one on agro-food knowledge management) have been brought together for the timely identification of key drivers of change requiring policy action at the national and European levels. SCIPOD-AF discussions are regularly fed by research outcomes from leading European Agro-Food Observatories and by 2020 the EC expects to launch an integrated Agro-Food Observatory for the EU, with links to all nodes of the European Alert System for Plant & Animal Diseases (ASPLANDI).

SCIPOD-AF Timeline

2007	**Now (2010)**	2020
• Creating a agro-food policy network (AF-PN) • Creating a agro-food knowledge management network (AF-KMN)	• Creating the European Science & Policy Dialogue on Agro-Food (SCIPOD-AF) by bringing together once a month representatives of the AF-PN and the AF-KMN • Linking SCIPOD-AF to key centres/labs in Europe, such as EFSA (EU), CISA (SP), AFISA (FR), LINHOLM (DK), PIRBRIGHT (UK), LEUJSTAD (NL) and RIEMS (DE), for example.	• Building a virtual and integrated Agro-Food Observatory for the EU
• 0.5M euros	• 0.5 euros	• 1M euros

EUGENE project on gene banks becomes non-profit inter-governmental organisation



EUGENE began in 2007 as a consortium supported by the EC, several national governments, research organisations, firms and NGOs. From its creation it aimed at becoming a non-profit, self-financing entity, generating income through services used by companies and other research units. At first, EUGENE focused on upgrading and expanding existing infrastructures.

The move towards a public-private partnership (PPP) model, backed by intergovernmental agreements, is based on a feasibility study showing that incomes generated from services could actually cover management costs in the future. This model required a better understanding about investment and ownership issues. Therefore, a board of representatives from the private sector (playing dominant role), policy-makers, NGOs and the research community was created. Access to EUGENE is now financed by various sources, depending on the users: public for researchers (EC and national) and private for companies. Overall, EUGENE is expected to help that relevant safety and ethical standards are observed, in sum, a code of good practices be respected.

EUGENE Timeline

2007	**Now (2010)**	2015	2020
• Creating consortium with EC and national funds • Upgrading and expanding RI	• EUGENE based on a new PPP model • 5-year funding secured • Management and other details clarified by feasibility studies.	• Consolidating a service package • EUGENE becomes a certified brand used pubic & private partners in their products • New players every year	• Re-launching EUGENE (Phase II)
• 4M euros	• 3M euros	• 2M euros	• 1M euros

Section 4: Final remarks

Policy recommendations on RIS

- Increased attention to be paid on **IPR policy** affecting the issue of ownership on new varieties developed by private companies with genetic material acquired from public genebanks. (investigation of good IPR practices in current shared facilities, OECD reports, etc.)
- Development of **discussion platform** *(*range of workshops in selected areas) for bringing people together assessing the state-of-the-art RI in MS and CEE countries, suggesting actions for their optimization and complementarity, unifying data (language, formats) and overcoming access barriers.
- EC to promote the creation of a **standard RI definition and classification** (a 'Frascati Manual' type of handbook for RIs) – using the recent definition from the Commission creates difficulties in drawing borderlines between types.
- Development of set of **case studies** and **real-life examples** by creating **national inventories** for identifying best performing RIs and their development policies following the two similar surveys held by the Commission.
- Development of **Guide** on designing best performing RI, attracting funding, managing cash flows, IPR policy, etc in order to avoid 'one size fits all countries' approach and to upgrade national RI by adopting good examples from other countries.
- Careful approach to **managing general discussions on infrastructure** as very difficult issue of high political interest related to significant funding requirements, location specifics, sensibility for policy making (e.g. diseases, food crises) and specifics of RIs depending on the sub-sectors they operate (e.g. plant compared to animal health).
- Establishment of **closer links** to existing structures at political level, high-level decision making and expert levels (for example, involving Chief Veterinary Officers in discussing RI issues at their monthly meetings; to interact more actively with the existing ERANets)
- Increase the **capacity of harnessing existing knowledge** instead of conducting new research projects.
- Design of **new models of governance**, especially in the agri-food sector, are needed to overcome locking RI into long-standing old system.
- Monitoring the outcomes of the restructuring of agri-food sectors in EU countries and to measure the improvements achieved.
- Strengthening the **strategic capacity of the directors of S&T research in Europe** – very few discussions are driven by strategic thinking. **One of the single biggest jobs for foresight is to build strategic capacity which is always a learning experience.**
- **Foresight projects** are required on identification of agri-food sector's needs, setting priorities and describing the process of meeting them by research. Appropriate RI and institutional structure will be the outcomes of the discussions as necessary tools for

implementing the process. At EU level foresight exercises present good opportunity for NMS for more active involvement in R&D process by networking research.

The case of restructuring institutes in NMS – the key issue in these countries is the lack of finance for research in general. Business always gets priority over research – foreign investors do research in their home countries. Business wants results now without investment – many private research institutes recruited former public sector researchers, using their knowledge acquired at their last jobs without contributing to knowledge creation by any training since then.

- More strict division defined by the Commission in RI access level considering the type of data it operates and its level of security.
- Establishment of **closer links with the 6 ETPs in the agri-food area** (e.g. Food for Life) and their strategic research agendas which envisage identification of problems to be solved in the sector as well as the knowledge and human resources required. The ETPs scenarios in strategic research agenda offer opportunity for collaboration with the ForeIntegra scenarios for more industry dimension with large coverage of 25 countries which have registered in the ETP "Food for Live" by supporting own national technology platforms.
- Creating an **observatory and inventory of agri-related citizen needs** for monitoring criteria on which consumers determine their needs

Using Foresight to identify future needs for Research Infrastructure

- Evaluation of R&I proposals is a very sensitive issue depending on who evaluates – each county is willing to host RIs. Foresight can be applied prior to the evaluation process for determining optimal location and can be carried out even by the evaluators.
- More emphasis is to be placed on real foresight which aims a vision of 20 years ahead instead of period of 3/5 years which is important for competitiveness. One general remark is that the workshop had not been long-ranging enough
- Consider differences between scenarios and visions
- Foresight is good for developing conceptual models/ feasibility studies and for setting up new ideas for RIs
- It is important to Involve S&T policymakers in foresight exercises, including sectoral level
- Foresight on citizen community needs required – RIs are traditionally closed structures – how to make RIs more accessible to end users.
- Participation of SMEs in foresight programmes is needed
- Agricultural world has to get connected to the rest of the world – foresight can play a role in identifying those areas where agri-food sciences connect to other sciences e.g. bio-nano technology. These areas of contact could be productive reflected by the RI.
- Foresight helps building ownership by different stakeholders on strategic choices.

Section 5: Annexes (Workshop Process & Discussions)

Below are summaries of each of the workshop sessions. Much of the work was done in groups so as to make discussions more efficient and inclusive. The working groups' composition was chosen on a random basis.

Discussion A: Discussion on Drivers of the Agri-Food Sector

Objective of the Discussion:

1. To give ownership to the workshop outputs by having participants refine a list of Agri-Food (A-F) and Biotech Drivers prepared by the project team; and
2. To review of the Drivers in the context of the CEE Region

Outline of the Process:

1. **PPT presentation** setting out 15 A-F Drivers
2. **Split into three groups**, with each group discussing 5 A-F Drivers with respect to the following questions:
    a. Generally speaking, are there any Drivers more important than those listed?
    b. Are there any Drivers specific to the CEE Region more important than those listed?

Output:
1. Revised List of A-F Drivers relevant to the CEE Region

	List of suggested drivers (PPT)	Discussion remarks on suggested drivers	WG
Agriculture	- WTO and Trade Liberalisation	Agreed to be powerful driver	**WG 1.**
	- Climate Change	Agreed to be powerful driver	
	- CAP Reform	Agreed to be powerful driver	
	- Environmental / Biodiversity Concerns	Turkey & Bulgaria are reach in genetic resources and can act as centres in genetic resources and biodiversity	
	- Animal Welfare Concerns	Remark given by other WG*	
	New Drivers and considerations: - the drivers in Agri-Food must be grouped as **Economic, Environmental and Social** - the **governance and organizational issues** are missing in the list - **land ownership and land reform is very important driver for CEE** - **'Food-feed-fuel' discussions shape agriculture** (bio-fuels in competition with food production) - the **'fork to farm' thinking** influence the agricultural production - **drivers in agriculture are influenced by many external drivers** - employment, interest rates, urban-rural dynamics relations, genetic diversity, technology developments in areas outside agriculture - the **combination of competitiveness with social issues** is important political driver		
	***Additional remarks made by other WG:** - there is **increased demand for wider diversity of products**		

	- there are **new emerging diseases** to be researched not only by biotech but by many other disciplines especially agriculture (i.e. to cope with the new diseases coming from Africa) - major problem is **animal infertility** which has nothing to do with biotech		
	- Demand for Non-Food Crops	No comments made	WG 2
	- Identification and Detection of New and Emerging Diseases	Further defined as **Diagnosis of new, emerging and re-emerging diseases**	WG 3
Food	- Increasing Link between Nutrition and Health	No comments made	WG 2
	- Food Safety Concerns	Determined as major driver for policy-makers and as driver with CEE importance	
	- Restructuring of the Food Industry	Determined as driver with CEE importance combined with suggested new driver: *ambition to make business*	
	- Food Consumption Behaviours	Agreed to be very powerful driver	
	New Drivers and considerations: - **Ambition to make business** was suggested as new driver, related to restructuring food industry - **Food quality** in terms of food authenticity, specificity, links with policies of food production and respective businesses was raised as driver - **Securing food** as ensuring access to food on global basis was raised as new driver - In reality the most important driver for research is the research itself - **researchers-driven research**		
Biotech	- "'omics" technologies and bioinformatics	**Bio-radiation** was added	WG 3
	- Developments in New Reproductive Technologies	No comments made	
	- Public Acceptance of Biotechnology	Agreed to be very powerful driver with CEE importance	
	- Availability of Skilled Human resources	To be more focused on the link between human resources and RI Human resources problem and brain-drain are- very important issues for CEE	
	New Drivers and considerations: - the influence of the **multinational companies** was suggested as new driver - **IPR issue** (cost of patenting, confidentiality of results) is an important driver for CEE - **EU legislation and the Cartagena Protocol on Biosafety** suggested as new driver or complementary to Public acceptance of biotechnology - **Nanotechnology** and **convergence technologies** are missing in the suggested list		

Discussion B: EU Agri-Food Research Vision

Objective:

1. To refine the European vision for Agri-Food Research in light of the Drivers discussion; and
2. To adapt the vision to a CEE Regional context.

Outline of the Process:

1. **PPT presentation** setting out the main elements of an EU Vision for A-F – in the form of bullets under a few thematic sub-headings

Main elements of EU Agri-Food Research Vision

- the sustainability of agriculture and rural development are the focus of research policy
- a substantial part of the EU research budget for food technology and agricultural research is used for practical research into sustainability and for comparative investigations of different farming systems
- research into alternative forms of production and sources of income in rural areas is a priority of research policy
- research into improving food quality and safety by strengthening links between consumers and producers (the "fork-to-farm approach") is a major priority
- in the interests of protecting consumers' health, the complex interrelationships between nutrition, food quality, actual dietary behaviour and health is an even greater priority of European research
- public debate is held on the purpose of research and the evaluation of findings when granting public funds for research
- there is increased funding for on-farm research, with an emphasis on the diversification of agricultural activity and appropriate farming practices, in particular with regard to breeding
- research into non-food uses of agricultural raw materials, which may contribute not only to sustainability but also to new economic activity in rural areas
- favourable conditions for biotechnology research exists in the Union, so that such advanced research can develop successfully in the Union and return to the Union
- increased transparency of Community research funding and a better communication of research findings, both within the scientific community and to agricultural practitioners and rural development players
- coordination of research activities between the EI, the Member States and the regional research institutions is much improved.

2. **Split into three groups**, with each group discussing the whole A-F Research Vision, with respect to the following questions (40 min):
    a. Are there any gaps or inconsistencies in the European vision?
    b. In what ways does the vision need to be adapted to take account of the CEE Regional context?

Output:

1. Revised Vision on A-F Research for the EU that is relevant to the CEE Region

The Sector Vision of the Budapest Group

For Europe to have a competitive and sustainable agriculture the sector must be:

- Profitable/competitive
- Sustainable in all respects – environmental, economic and social
- Meet safety and health concerns – 'fork to farm' principle
- Adapted to climate and other environmental changes
- Agri-food systems will be diversified broadly in three systems:
- **A world market competitive sector** operating on a large scale for food and other products, i.e. resources for other sectors and industrial red/blue/green/white services of the knowledge-driven bioeconomy
- **Smaller scale production** with shorter, more transparent food supply, often with organic farming, closer interaction between agri-food and consumers and less burden on environment
- **Producing public goods** (landscape, environment, biodiversity): tourism and social outputs

The A-F sector includes not only consumers and producers but also food manufacturers and retailers, the financial infrastructure and research. The food processing industry is adding value to agricultural production and therefore is an important actor in research and innovation. Retailers currently squeeze the sector with negative consequences for manufacturers and growers.

The sector must act with social responsibility. A dialogue between society and the sector involves the public taking responsibility for its lifestyle choices. Europeans are refined consumers.

Governance reform is key to the future of the sector – to include better articulation between the EU and national level and regional communities/citizens– involving all stakeholders who have the knowledge to implement policies in this sector. We also need flexibility of policy – recognising that one size does not fit all and that Old Member States tend to drive the EU policies in the sector.

Innovation is the key need – must question the need for new research when there is a large body of unexploited existing knowledge that could be configured to support solutions to key problems in the sector. This demands a **specific knowledge infrastructure** that can deal with tacit/traditional knowledge as well as codified knowledge (which can be disciplinary and reductionist). The key rationale for research becomes facilitating access to knowledge through creating absorptive capacity and providing an entry ticket to the knowledge community.

With respect to the knowledge infrastructure each nation is creating it separately but none provide the next step for creating an innovation economy. **We need a serious commitment to knowledge brokers rather than basic research.** Applied research is also neglected.

Specifically for CEE countries:

- The A-F industry in CEE countries must be convinced that **innovation is essential** for the competitiveness and survival of companies in the agri-food dynamic sector.

- The region needs better relations between consumers, researchers and industry – at present research completely separated from industry.
- Subsidy is necessary to preserve local diversity/taste of food – some typical products already disappearing.
- There is a need for reform of production systems and better logistics.
- For agriculture a large scale farming producing cheap reliable products is needed.
- There is also opportunity for organic farming.
- The needs of the rural community have to be considered - linked to social policy.
- The CEE region also has an asset in potential exploitation of genetic resources – using gene banks for preserving biodiversity
- In CEE region the distinction between traditional (tacit) and codified knowledge has to be considered – need to get balance right between moving more towards transfer of codified knowledge, getting beyond word-of-mouth to use e-infrastructures for sharing knowledge among farming communities.
- Link exists to the need for flexibility to allow different communities to develop own systems and good interaction between the communities

Discussion C: Key Research Directions and Research Systems

Objective:

1. To determine Key Research Directions (KRDs) consistent with the EU vision;
2. To identify desirable A-F research system attributes; and
3. To consider the above in the CEE Regional context

Outline of the Process:

1. **PPT presentation** listing possible KRDs

EU Agri-Food Key Research Directions (KRDs)

FABRE ETP	Plants for the Future ETP
- Quantitative Genetics and Operational Genetics - Advanced Modelling for Management Purposes - Phenomics - Identification and Traceability Technologies - Genomics - Numerical Biology - Biology of systems and Traits - Whole-Animal Biology and Gene-by-Environment Interactions - Population Biology - Reproduction technology - Biotechnologies - Socio-Economic Research - Animal Science	- Develop and produce safe and high quality food - Create food products targeted at specific consumer groups and needs - Produce safe, high quality, sufficient and sustainable feed - Improve plant productivity and quality - Optimise agriculture to further reduce its environmental impact - Enhance biodiversity - Enhance the aesthetical value and sustainability of the landscape - Develop advanced plant-based raw materials and pharmaceuticals - Develop plants as energy production systems - Convert plants into production factories
Food for Life ETP	
- Understanding brain function in relation - Understanding dietary effects on immune and intestinal function - Understanding the link between diet and metabolic function (obesity and associated metabolic disorders) - Measuring consumer behaviour in relation to food - Developing comprehensive models of consumer choice processes - Producing tailor-made food products - Improving understanding of process-structure-property relationships - Predicting and monitoring behaviour and fate of relevant known and emerging biological hazards	

- Predicting and monitoring behaviour and fate of relevant known and emerging chemical hazards including toxins of biological origin
- Improving risk assessment and risk-benefit evaluation
- Developing tools to ensure security of the food chain
- Improving the innovation potential of the food chain
- Supporting competitiveness through integration
- Participation of small producers in complex food chain operations
- Integrating food chain management and the consumer

2. **Split into three groups**, with each group considering the whole list of KRDs with respect to **science-oriented**, **business/user-oriented and consumer-oriented research** and to the following questions (20 min):
    a. Are there any gaps or inconsistencies in the list of KRDs provided?
    b. In what ways does the list need to be adapted to be credible in the CEE Region?
3. Short presentations to plenary and discussion of KRDs, with a view to arriving at a revised list of KRDs (20 min)
4. PPT presentation setting out a list of desirable attributes for A-F Research Systems in the CEE Region (15 min)
5. In plenary, participants consider the following questions (30 min):
    a. Are there any gaps or inconsistencies in the description of desirable research system attributes?
    b. What are the barriers for realising these attributes?

Output:

1. Revised KRDs, determined according to the underlying rational of the research system

Budapest Group Observations on Key Research Directions and Criteria

The expectation is that research will be driven by multiple rationales including agendas emerging from the research community itself, from business and other users, and from communities and citizens.

The criteria for each of these sectors will be different. For **science, the standard** peer review considerations are applied (novelty, excellence, competence and composition of team, and availability of facilities). For **business/user-oriented research**, the agenda is problem-driven and solution-oriented. Novel ideas are still welcome but the main aim is to meet regulatory requirements/ standards and to support wealth creation and hence the sustainability of the business. Selection must be changed to favour multidisciplinary approaches (also to be reflected in education). The **citizen-oriented agenda** is determined by citizen involvement and dialogue and to long term public goods that would not be funded by industry.

Specific research areas emerging in a science driven research system are mainly concerned with understanding of principles underpinning various fields – these include bioscience on a molecular level, nanotechnology research, modelling of climate and environment, principles of diseases in animals and crops and transmission to people, animal psychology/behaviour, mapping biodiversity, consumer sciences and psychology.

In a business/user-oriented research system the agenda depends on the needs of the sector and is very specific; so we may look at broader challenges. We always need full set of academic disciplines to understand problems, to find solutions, so we must escape the provincialism of traditional agronomic disciplines – research should be multidisciplinary.

The citizen-oriented research agenda would consider an agenda driven by topics such as public goods biodiversity/ leisure/ informal economy. The long term public interests are not addressed by food and plant industry. These are long-term health /sustainability; healthy and tasty food and affordability; strategic capacity preservation; cheap and healthy basket of food and sharing with neighbouring countries; tacit knowledge use and preservation; finding alternative income and opportunities for farmers; the implications of the precautionary principle relating to hazards and anticipating highly disruptive events; consumer dynamics; and achieving the same or higher level of production by using less inputs at lower costs.

Discussion D: Research Infrastructure (RI) Drivers

Objective:

1. To refine a draft list of RI Drivers, taking into account the conditions in the CEE Region

Outline of the Process:

1. **PPT presentation** setting out 12 RI Drivers (5 min)
2. **Split into three groups**, with each group discussing 4 RI Drivers with respect to the following questions (20 min):
    a. Generally speaking, are there any Drivers more important than those listed?
    b. Are there any Drivers specific to the CEE Region more important than those listed?

Output:

1. Revised list of RI drivers relevant to the CEE region

	List of suggested RI drivers	Remarks on suggested RI drivers	WG
S&T needs	1. **Increased need for** better respond to the scientific community (bottom-up needs and need for state of the art RIs to compete in scientific leadership)	Rephrasing 'increased need for' to avoid normative formulation. Bottom-up needs and state-of-the-art facilities but diversified and fragmented at different levels. For CEE also a level of competition at country level and at level of regions competing to attract research infrastructures.	**WG 1.**
	2. … better response to the EU community (FP7 Thematic Areas needs)	Rephrasing to 'EU scientific community demand'	
	3. … better response to cross-disciplinary disciplines and research fields (such as biotechnology and nanotechnology, for example)	Rephrasing to 'emerging fields and transdisciplinarity'	
	4. … better complementary RI capabilities to tackle new / unexpected S&T developments (e.g. state-of-the-art RI and exploiting potentialities / opportunities of convergence such as bioinformatics, biofuel)		
	New Drivers and considerations: - to consider the need to attract young researchers and recruiting them - CEE to catch up in achieving higher quality in research. - in long term it is difficult to keep S&T needs separate from financial sustainability issue – interfacing with other needs so that RIs remain financially sustainable, for instance contract research etc.		

<table>
<tr><td></td><td colspan="2">- proximity and shared space – geographical, spiritual and proximity to end users
- the global competitiveness in science</td><td></td></tr>
<tr><td rowspan="5">Technical needs</td><td>1. RI driving RI (e.g. more sequences / bio-banks may require greater storage / processing tools)</td><td>RI driving RI in terms of upgrading and extending the capacity</td><td rowspan="5">WG 2.</td></tr>
<tr><td>2. More emphasis on safety in experimental facilities</td><td>Security and sustainability of the RI</td></tr>
<tr><td>3. Increased need for easy-to-use and better access to RI (unique / distributed / virtual)</td><td></td></tr>
<tr><td>4. Increased need for more robust and reliable authorisation and authentication schemes for using RI</td><td></td></tr>
<tr><td colspan="2">New Drivers and considerations:
- creating new technical capabilities to extent knowledge (upgrading existing one)
- verification of feasibility in terms of efficiency, public interest, avoiding overlapping
- improving the running of the facility in terms of technical equipments</td></tr>
<tr><td rowspan="5">External / Structural needs</td><td>. More efforts towards ERA (instruments promoting RI Facilities / Resources / Tools)</td><td>Transition programs and ways of exploiting EU funds (facilities, resources, tools) structural funds and FP7, etc.</td><td rowspan="5">WG 3.</td></tr>
<tr><td>. Increased need for creating / adapting common EU27 / global RI standards</td><td>Agreed</td></tr>
<tr><td>. Increased need for new / better integration of RI services…</td><td>… to meet consumer/market demands</td></tr>
<tr><td>. Stronger industry agendas (e.g. Monsanto) – also industry demands graduates familiar with the latest infrastructures</td><td>Agreed</td></tr>
<tr><td colspan="2">New Drivers and considerations:
- long-term needs (preservation of the biodiversity, longevity of the data base; energy and food crises)
- harvesting research results and exchange of information
CEE:
- preservation of genetic resources
- long term monitoring of climatic and environment changes
- new emerging diseases
- ongoing industrial policies
- information and communication infrastructure needed to make use of databases</td></tr>
</table>

Discussion E: RI Investment-Accessibility Matrix

Outline of the Process:

2. **PPT Handout** listing several possible A-F / Biotechnology RI – in the form of bullets under three headings: facilities, resources, and tools
3. **Split into three groups**, with each group considering the whole list of RI with respect to the following questions:
    a. Are there any gaps or inconsistencies in the list of RI provided?
    b. In what ways does the list need to be adapted to be credible in the CEE Region?

Output:

Table 1: RI Investment-Accessibility Matrix

Investment Required	Accessibility			
	Local	**National**	**CEE Region**	**EU**
> €5M				
€0.5M - €5M				
< €0.5M				

Experts' suggestions for RI made to the Matrix:

(S) – single sited RI, (D) – distributed RI, (V) – virtual RI

Code	Segment EU, > 5 M euros	Type of RI (S, D, V)
	Non-Food production RI	(S)
	Pan-EU RI for Nano-Structuring	(D)
	ICT BIOCHAIN	(V)
	Natures & Industrial Technology Transfer Centre	(D/V)
	Human Nutrition and Health Research Facilities (CoEs)	**(D)**
	Consumer Science Networks	(D)
	Plant and Animal Diseases RI (inclusive High Security Laboratories for Plant Infectious Diseases and Emerging Zoonotic Diseases (biosecurity level 4))	(S)+(D)
	EU Centre of Biodiversity	(S)
	Joint **Genomic Centre for CEE** with pan-EU dimension dealing with: EU-economically important plants, animals, fish, pharmaceuticals, rare & endemic micro-organisms incl. Botanical gardens	(D)
	Observatories – Forestry / Environmental / Agricultural / Biodiversity	**(S/D/V)**
	Virtual Centre for Innovations in Biotechnology	(V)

Code	Segment EU, 0,5 – 5 M euros	Type of RI (S, D, V)
	EU Databank for Animal Diseases	(V)
	Databank for Monitoring Climatic and Environmental Changes	(V)
	ICT in AGRI – applications of informatics, databases / mapping, web services in agriculture	(V)
	Agriculture Institute on training, water irrigation, seed / gene banks for EU medicinal plants, food quality, etc.	(D)
	Aquaculture RI– fish farming (tuna fish, exotic fish), data bases	(D)
	Agro-Ecosystem Observatories on EU long term farming systems and adaptation of agri technologies to climate conditions	(D)

Code	Segment EU, < 0,5 M euros	Type of RI (S, D, V)
	Radio-Biology Facilities	(D)
	EU Coordinated Network of High-Security Laboratories	(D)
	RI for Young Scientists in Agri-Food	(D)

Code	Segment CEE region, >5 M euros	Type of RI (S, D, V)
	CEE Centre and Units of Animal Diseases	**(D)**
	Clinical Research RI	(D)

Code	Segment CEE region, 0,5 – 5 M euros	Type of RI (S, D, V)
	RI on Agricultural Policy Network	(D)
	CEE Educational Centres Network for training project leaders, knowledge managers, managers of Agri-Food RI	(D)
	Organic Innovation Lab	(S)
	Non-Food Production RI	
	GM Testing labs	(D)
	Agriculture Observatory	(S)
	Bioinformatics centers	(V)

Code	Segment CEE region, < 0,5 M euro	Type of RI (S, D, V)
	CEE Databank for Food & Agricultural Research	(V)
	Bioinformatics centers	(V)
	Bio and Tissues Bank	(S)

Code	Segment National, > 5 M euros	Type of RI (S, D, V)
	Biotechnology Pilot Plants	(S)
	Genetic and Biologic Resources Centre and Databases– plants, animals, microorganisms	(D)+ (V)
	Ageing and Rural Migration RI	(V)
	Organic Innovation Labs	(D)

	Plants & Animals "'Omics" Centre and Bioinformatics	(S)
	Human Nutrition Research Facilities	(D)
	Pilot Food Processing Plant	(S)
	GM Testing Labs and field trials	(S)
	Animal Health and Welfare	

Code	Segment National, 0,5 – 5 M euros	Type of RI (S, D, V)
	Animal Diseases Research Facilities (High Security Labs for Infectious Animal Diseases inclusive)	(S)
	National Observatories – Agriculture / Forestry / Environment / Veterinary Medicine / Agro-Ecosystem	(D)+(V)
	RI for Agriculture Engineering	(D)
	Numeric Simulation Tools and Bioinformatics centers	(D)+(V)
	Rural Development Research Virtual Centre	(V)
	National Industrial Technology Transfer Centre of Food Federations	(V/S)
	Genetic & Genomic Resources Collections and Botanical gardens	(D)+(V)
	Databank for Food & Agricultural Research	(V)
	National Genomics & Nutrition RI (social sciences incl.)	
	Centre of Biosafety and Genetic Resources	(S)
	Technological Centre for Process Studies	(S)
	Renewable Energy RI	(V)
	The ICT for the Biochain	(V)
	The Virtual Food Factory	(V)

Code	Segment National, < 0,5 M euros	Type of RI (S, D, V)
	'Omics Technologies RI	(S)
	Microorganisms Collections	(D)
	RI for Agri-Food Methodology	(D)
	Virtual Centre for Rural Development	(V)

Code	Segment Local, > 5 M euros	Type of RI (S, D, V)
	Test Facilities for Aquaculture	(S)

	Environmental Protection Research Net	(D)
	Genetic Resources Centre	(S)
	Sustainable Forestry RI	(D)
	Radio-biology facilities	(S)
	Clinical Research RI	(D)
	Agri-Food Relevant Climate Change Observatory (Northern / Southern EU countries)	(V)

Code	Segment Local, 0,5 – 5 M euros	Type of RI (S, D, V)
	Technological Centre for Process Studies	(S)
	Observatories - Agri-Food / Environmental / Biodiversity	(D) + (V)
	Radio-biology facilities	(S)
	Virtual Centre for Nano RI	(V)
	Genetic Resources Centres and Botanical Gardens	(V)
	Pilot Plant for Food Industry	(S)
	DNA sequencing	(D)
	Applied Research Facilities	(V)

Code	Segment Local, < 5 M euros	Type of RI (S, D, V)
	Observatories of Main Farming Systems	(D)
	Genetic Resources Centre	(S)
	Agri-Food Learning and Human Resources RI	(S)
	Organic Farming RI	(D)
	Knowledge Management Systems for Corporate Foresight	

Section 6: References and support material

Web-links

FP7 Capacities Programme
http://cordis.europa.eu/fp7/capacities/home_en.html

European Strategy Forum on Research Infrastructures (ESFRI)
http://cordis.europa.eu/esfri/

European Technology Platforms (ETPs)
http://cordis.europa.eu/technology-platforms/home_en.html

ETP "Food for Life"
http://etp.ciaa.be

ETP "Plants for the Future"
http://www.epsoweb.org/catalog/tp/tpcom_home.htm

ERA-Nets in FP6
http://cordis.europa.eu/coordination/projects.htm

European Research Advisory Board (EURAB)
http://ec.europa.eu/research/eurab/index_en.html

Knowledge based bio-economy
http://ec.europa.eu/research/biosociety/kbbe/kbbe_en.htm

SCAR Committee
http://ec.europa.eu/research/agriculture/scar/index_en.cfm?p=3_org

SCAR Committee foresight exercise "EU Outlook Agriculture 2020"
http://ec.europa.eu/research/agriculture/scar/index_en.cfm?p=3_foresight

European Foresight Monitoring Network (EFMN)
http://www.efmn.info/

European Union—Science and Technology foresight
http://www.cordis.lu/foresight

ERA WATCH Research Inventory
http://cordis.europa.eu/erawatch/index.cfm?fuseaction=ri.content&topicID=373&countryCode=ES&parentID=4

OECD International Futures Programme "Infrastructure to 2030"
http://www.oecd.org/department/0,3355,en_2649_36240452_1_1_1_1_1,00.html

Publications

Web-reports

European Technology Platform on Food for Life: The vision for 2020 and beyond
http://etp.ciaa.be/asp/home/welcome.asp

EC documents

European Roadmap for Research Infrastructures: Report 2006
http://cordis.europa.eu/esfri/roadmap.htm

THE AGRIBLUE BLUEPRINT: Sustainable Territorial Development of the Rural Areas of Europe
http://www.efmn.info/blueprints/AGRIBLUE.pdf

EURAB Recommendations on Research Infrastructures (RI)
http://ec.europa.eu/research/eurab/pdf/eurab-03.053-infrastructures-recommendations.pdf

Standing Committee for Agricultural Research (SCAR) Note to ESFRI (31 August 2005): Research Infrastructures required in the field of Agricultural research
http://ec.europa.eu/research/agriculture/scar/pdf/esfri_en.pdf

Other documents

"EU Agri-Food Industries & Rural Economies by 2025 – Towards a Knowledge Bio-Economy – Research & Knowledge -Transfer Systems" (December 2006),
Liam Downey, School of Agriculture, Food Science & Veterinary Medicine, University College Dublin, Ireland
http://ec.europa.eu/research/agriculture/scar/pdf/scar_foresight_rural_economy_en.pdf

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