European Technology Platform on Food for Life

The vision for 2020 and beyond

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CIAA

Confédération des industries agro-alimentaires de l'UE
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A number of organisations provided input to this document. This does not in any way indicate explicit approval or endorsement of the document's views, visions or opinions by any individual organisation.

For more information on the ETP, visit our website http://etp.ciaa.be

Foreword

It has long been recognized that whilst the quality and quantity of Europe's research community match those of North America and the Pacific Rim, the wider impact of this research is lower than that of these trading competitors because of the less effective transfer of this knowledge to industry.

In order to address this so-called European Paradox and strengthen the European-wide innovation process, the European Commission has introduced the concept of European Technology Platforms whereby relevant stakeholders in key economic sectors commit themselves to working together to identify the innovation challenge, develop the necessary research programme and implement the results.

Under the auspices of CIAA, the umbrella organisation of the European agro-food industry, this European Technology Platform Food for Life addresses these requirements for the agro-food industry, the largest manufacturing sector in Europe. There is an increasing societal awareness of the opportunities to improve the quality of life through healthy eating and of the contribution that sustainable production can make to improvement of the overall environment. The preferences of consumers for quality, convenience, diversity and health, and their justifiable expectations of safety, ethics and sustainable food production serve to highlight the opportunities for innovation. In some sectors, such as food safety, process engineering and sustainability, Europe is already a world leader and innovation and investment is high. It is thus a very obvious target for innovation.

Unlike many other sectors, agro-food has not previously developed a structure to bring all of its stakeholder communities together. Thanks to the enthusiasm of the Core Team, the initial stages of building this ETP have, therefore, already achieved a great deal. These activities, however well intentioned, would have little value had not the individual stakeholders subsequently so positively indicated their support and commitment.

This document describing the vision for 2020 and beyond is thus only a beginning, but one that provides a firm basis for the next stages of consultation, discussion and debate leading to a Strategic Research Agenda and Implementation Plan. During this period, every opportunity will be sought to work closely with complementary ETPs, including those on *Plants for the Future and Global Animal Health,* with the *EU Platform on Diet, Physical Activity and Health,* and with individual new instruments supported through the Framework Programmes. In this way we believe the Platform will most effectively organize and deliver innovation.

We look forward to the challenges ahead of us with optimism, in the knowledge that by working together with individuals, companies, including SMEs, and organisations from EU Member States, Associated-, Accession- and Candidate Countries we can give shape to the European Research Area, enhance the impact of EU R&D development, create competitiveness and deliver tangible benefits to the European citizen. In this manner we can also ensure that Europe is both a global leader in innovation across the entire agro-food chain and a region that offers outstanding career opportunities to its young people.

Brussels, 5th July 2005

Mr Jean Martin
President of CIAA

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Executive summary

Vision of the European Technology Platform on Food for Life

An effective integration of strategically-focussed, trans-national, concerted research in the nutritional-, food- and consumer sciences and food chain management will deliver innovative, novel and improved food products for, and to, national, regional and global markets in line with consumer needs and expectations. These products, together with recommended changes in dietary regimes and lifestyles, will have a positive impact on public health and overall quality of life ('adding life to years'). Such targeted activities will support a successful and competitive pan-European agro-food industry having global business leadership securely based on economic growth, technology transfer, sustainable food production and consumer confidence.

The European agro-food industry is the largest manufacturing sector in Europe. The food and drink industry had a turnover of 810 billion euro in 2004, transforming over 70% of the EU's agricultural raw materials and employing over 4 million people, the majority within the SMEs sector. The European agro-food industry is a leading global exporter and it affords significant added value and offers scope for growth within new EU Member States, development of regional economies and exploitation of cultural diversity and tradition. The European agro-food industry is thus central to the wider, economic development of Europe.

There is an increasing societal awareness of the opportunities to improve the quality of life through healthy eating and of the contribution that sustainable production can make to improvement of the overall environment. The preferences of consumers for quality, convenience, diversity and health, and their justifiable expectations of safety, ethics and sustainable food production serve to highlight the opportunities for innovation. In some sectors, such as food safety, process engineering and sustainability, Europe is already a world leader and innovation and investment is high.

A coherent research strategy for the future must be developed based upon the shared vision of the diverse stakeholders. Key elements of this flexible strategy comprise initiatives in food and health, food quality and manufacturing, food and consumer, food safety, sustainable food production and food chain management. These elements are to be supported by effective strategies for communication, training and technology transfer.

A step-change in research intensity and investment, together with effective technology transfer, is a prerequisite for ensuring that the European agro-food sector remains innovative and competitive. The private and public resources available for food research at the national level are insufficient to meet the challenges that will arise if the objective of adding 'life to years' is to be achieved. The Technology Platform Food for Life will galvanise the resources available at the national and EU level and ensure effective co-operation under the umbrella of a coherent Strategic Research Agenda and its associated Implementation Plan.

The European Technology Platform Food for Life will:

- Support a sustainable, successful and competitive pan-European agro-food industry;
- Provide increased employment and entrepreneurial opportunities for all of Europe;
- Ensure that the healthy choice becomes the easy choice;
- Underpin regulation and support policy making at national and regional level;
- Contribute to sustainable development in Europe;
- Enhance the ability of the European agro-food industries to create and exploit market opportunities that are less sensitive to price competition; and
- Promote the 'fork to farm' approach to add value to food chains.

In addition, the European Technology Platform Food for Life will:

- Provide an effective and sustained interaction between all stakeholders;
- Present a well-defined Strategic Research Agenda (SRA) for innovative food production;
- Offer an Implementation Plan that will include mobilization of resources to support pan-European collaborative research; training, education and dissemination;
- Ensure increased confidence in the food supply amongst European consumers;
- Significantly reduce health costs; and
- Enhance long-term career opportunities in European food science and technology.

1. Introduction

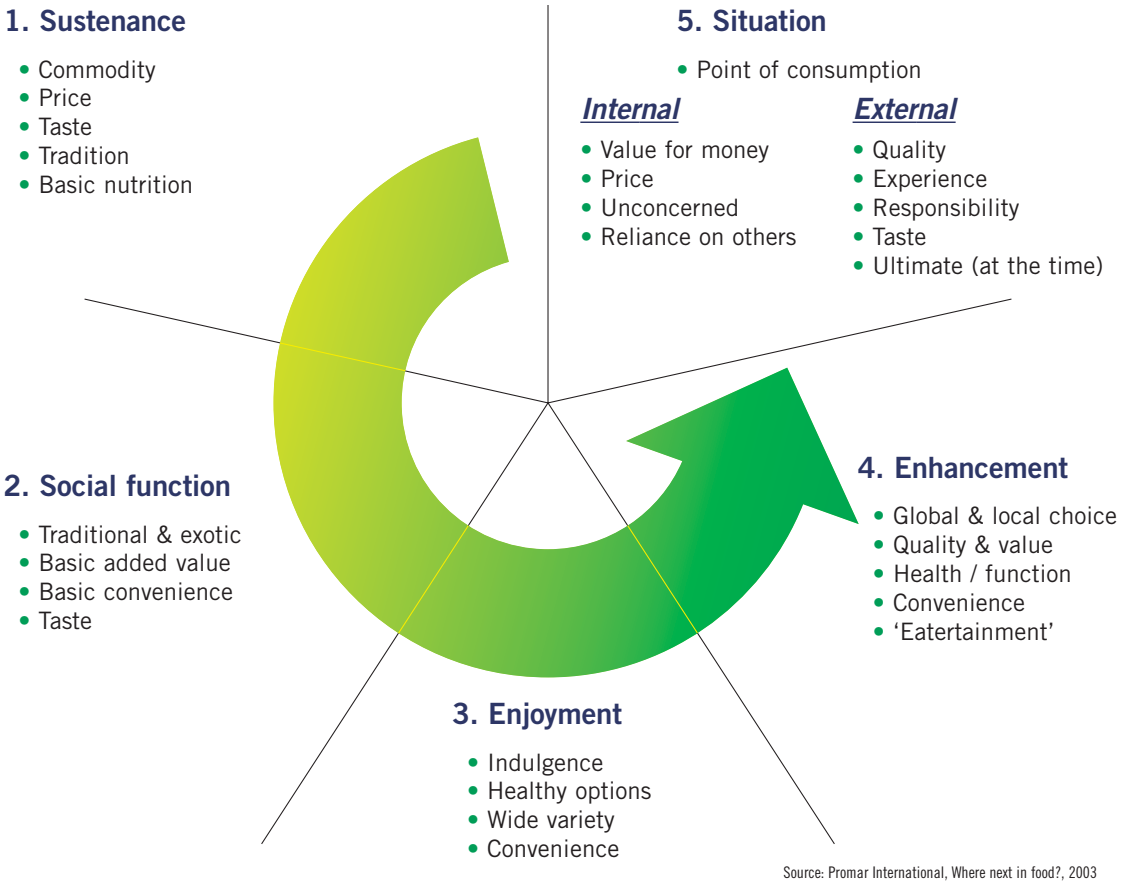
Food and drinks can contribute significantly to the welfare and well-being of European citizens...

The food and drink industry is a powerhouse of the European economy, transforming over 70% of the EU's agricultural raw materials and employing over 4 million people, the majority (60%) within the SMEs sector, supporting some 280,000 companies, of these 99% are SMEs, and generating a positive trade balance with the rest of the world (1). The agricultural sector employs over 11 million people (2.3% of the population of the enlarged EU), many of who live in rural or less-developed areas of Europe.

The European agro-food industry provides the consumer with a wide variety of products and services, showing a continuous change over time in many countries (see also Figure 1). The future market will be influenced by:

- **What we consume:** from energy intake to healthy, wholesome and varied diets;
- **When we consume:** from regular meals to grazing and snacking;
- **Where we consume:** from domestic to out-of-home;
- **With whom we consume:** from social events to individual food intake;
- **How we prepare our food:** from raw materials to ready-to-eat and heat-to-eat.

Figure 1. The future market paradigm



Source: Promar International, Where next in food?, 2003

Foods and drinks, in the right amounts and proportions, make a major contribution to the well-being and healthy ageing of European citizens. Despite the increasing tendency for grazing and consumer demand for convenience foods, dinner remains one of the most important social and family events of the day in most European countries; in this respect, foods and drinks also bring pleasure to living.

The European agro-food industry is seeking to develop affordable, new and traditional products, which incorporate healthiness, convenience, are of high quality and safe to eat. Despite the various food scandals of the recent past and the ensuing loss of consumer confidence in food production, our food supply has never been safer. Moreover, its safety is continually increasing, in part as a consequence of major R&D investments in food safety by national and European governments, and through the establishment of the European Food Safety Authority.

... but lifestyles are changing

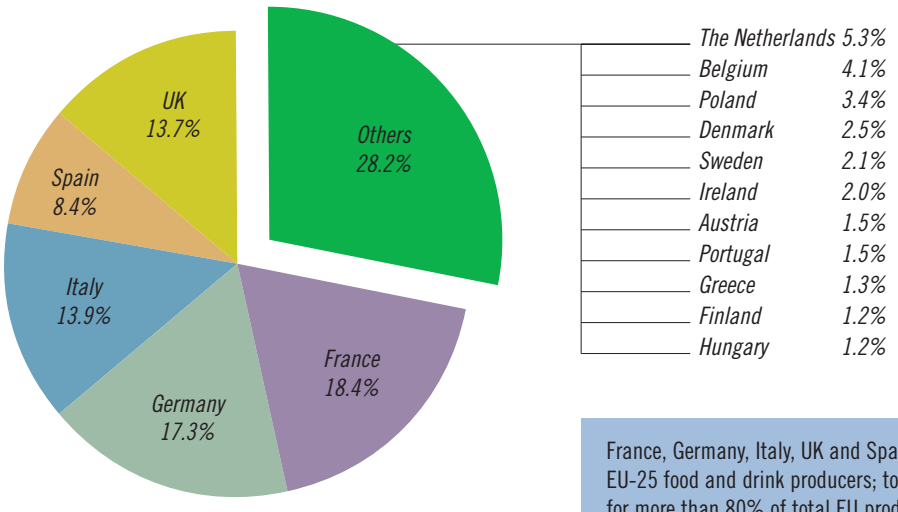
Although manufactured foods are safer than ever, excessive food intake, in conjunction with a decrease in physical activity has led to an increase of lifestyle-related diseases in European society. In the medium- to long-term, lifestyle-related diseases (such as obesity, coronary and heart diseases, and type 2 diabetes) will increase to unacceptable levels if appropriate measures are not taken now[1]. The agro-food industry recognises its responsibility in this area. Nonetheless more effort is required from the agro-food industry to provide the European consumers with healthy, convenient and tasty foods, and to inform consumers as to how such a diet, as part of a healthy lifestyle, can add life to years.

The agro-food industry is the largest sector in Europe...

The agriculture and food sectors are vitally important to the European economy. Together, they represent the third largest employer in Europe providing 16 million jobs in the EU-25 and the second largest exporter of foodstuffs globally, with agricultural exports worth 61,088 billion euro in 2002 (source: Eurostat).

The food and drink industry is the largest manufacturing sector in Europe with a turnover of 810 billion euro in 2004 (1). The sector is also an important pillar of the economy in many EU Member States (as shown in Figure 2). In 2001, for example, the industry generated some 185 billion euro of value addition in the EU-25, 17 billion euro of which originated from the ten new Member States (2).

Figure 2. Share of national food and drink industry in EU-25 turnover (%), 2003



France, Germany, Italy, UK and Spain are the largest EU-25 food and drink producers; together they account for more than 80% of total EU production.

Source: Eurostat, SBS, 2003

The food and drink industry covers a market of 450 million consumers in the EU. In 2003, the EU exported food products valued at 39.8 billion euro to the rest of the world and imported food worth 39.4 billion euro – reflecting an average annual growth of 4.5% and 4.3% respectively, for the period 1999-2003. The EU has become a major exporter of many foodstuffs and is the second biggest global exporter with agricultural exports worth almost 62 billion euro in 2002. The main destination of exports from the expanded Union is the United States, followed by Japan, Russia and Switzerland.

The EU is also the biggest global importer of agricultural products. In 2002 EU imports of agricultural products were valued at over 61 billion euro; the most important supplier of EU food products and beverages in 2002 was Brazil, which surpassed the United States and Argentina. Thus, the European agro-food industry is a leading global exporter with a positive trade balance. Despite these positive figures, overall growth of the food and drink industry was limited to 1.9% in 2003 (1).

The European food and drink industry transforms more than 70% of the raw material supply from European farmers into added value products. Moreover, it imports many raw materials from around the world and re-exports them after processing. This ability to add value provides the European agro-food industry with a significant competitive advantage. However, changing attitudes and behaviour in society and new and emerging consumer trends necessitate constant renewal of products and product concepts at an ever increasing pace. The agro-food industry must, therefore, constantly innovate its processes and products to remain competitive.

… but its competitiveness is at risk

The leading position of the EU agro-food industry will be threatened in the medium- to long-term if effective measures are not taken to improve its innovative power. Given the size and importance of this sector, such a decline will have serious 'knock on' repercussions for the European economy (employment, income, and growth) as a whole. Additional factors contributing to this situation include:

- Other economies recognise the importance of innovation just as much as the EU does. Innovation in US and Japan is continuing and new economies, such as China and India, are emerging. Adding value through product development alone will be insufficient to create the required innovations to compete with these economies.
- The European agro-food industry recognises its role in the prevention of lifestyle-related diseases. However, this new and comprehensive area requires completely new and innovative concepts, which cannot be introduced and exploited without substantial and targeted R&D investments.
- There is increased competition from non-EU, low-cost countries. Hence, competing on cost alone will not be sustainable in the long-term for the EU. In addition to a sustained attention to competitive cost reduction, the future of the EU food and drink industry lies in the production of value-added, quality goods using its technical know how, developing its capacity for innovation and further improving quality attributes to maintain and increase its share of world markets. In the absence of a sustained level of innovation and technological advance within the EU, there is a greater likelihood that EU markets will be increasingly supplied by companies investing outside its borders, attracted by lower employment costs and a reduced regulatory burden.
- Research efforts have been rather fragmented and low due, in part, to the atypical composition of the sector with its very many SMEs. In general, small-sized companies do not invest greatly in R&D. Large companies tend to focus more on marketing, since the strategy of 'selling the emotional benefits' of food has proved very profitable, and it is difficult to retain exclusive market share for long enough to give a return on capital investment. As a result, there are no effective drivers for large R&D investment in industry. National governments and the EU have further contributed to fragmentation by not supporting breakthrough science for the agro-food sector because their focus has been largely, and understandably, centred on food safety.

How to sharpen the innovation edge

A key asset of the EU agro-food industry (including plant-, animal- and fish production) is its cultural diversity, regional specialisation and long-standing tradition. Nonetheless, innovation is essential if it is to respond to consumer demands regarding quality, health, safety, diversity, convenience and affordability. The integration of the rich traditions of European cuisine with the innovation-driven market place represents a great and constant challenge, but it is one that must, and surely can be, met.

In this Vision Document the following steps are proposed in order to generate a competitive European agro-food sector that offers growth of the European economy in a sustainable manner:

- Focussing European innovation efforts on the following topics: Food and Health, Food Quality and Manufacturing, Food and Consumer, Food Safety, Sustainable Food Production and Food Chain Management, but ensuring that all R&D initiatives in these broad areas are holistically conceived across all of the themes with the perspective of the consumer as a major driver (the 'fork-to-farm' approach). Improvements in Communication, Training and Technology Transfer are a prerequisite.
- Increasing R&D investments from private- and from public organisations and target research on the priorities of a shared vision.
- Involving SMEs in the innovation processes.
- Aligning European, national and private funds (European Investment Bank, venture capitalists).
- Creating and supporting partnerships that innovate more effectively and which utilise knowledge that can be applied to the food sector. Examples are the manufacturing sector, pharma, health insurance sectors, etc.
- Generating and exploiting alternative business models.
- Improving innovation processes: R&D, technology transfer, blending of technologies.
- Effectively disseminating results; training people so as to provide the means by which the impact of the Platform is maximised.

YES to European Technology Platform on Food for Life

In earlier Framework Programmes (FPs), and especially within FPs 5 and 6, a particular priority was assigned to Food Quality and Safety (interpreted within a 'food chain' context). A continuation of R&D efforts of a significantly increased size in FP7 is considered indispensable given the importance of the food sector for the welfare and well-being of European society, its significance for job creation and regional development, and the overall competitiveness of the economy at both national and European level[2].

The European Commission proposes better framework conditions to foster integration of research activities and co-ordination of research and innovation policies, which justifies a significant boost of resources to research since technological development and innovation are at the heart of the knowledge-based economy (3). In this context, the European Commission's recently-published working paper on FP7, which proposes an 83% annualised budget increase for Food, Agriculture and Biotechnology, the knowledge-based bio-economies cooperative theme compared to FP6 is to be welcomed (4).

Concept of European Technology Platforms

Stakeholders coming together to define, and implement, a Strategic Research Agenda on a number of strategically important issues with high societal relevance where achieving Europe's future growth, competitiveness and sustainable objectives is dependent upon major research and technological advances in the medium- to long-term.

European Technology Platforms (ETPs) are structures that bring together companies, researchers (from both the natural and social sciences), consumers, the financial world and regulatory authorities at European level to define a common Strategic Research Agenda, which should mobilise a critical mass of – national and European – public and private resources.

A European Technology Platform on Food for Life is, therefore proposed on the basis of its:

- Societal relevance: Positive impact on Community policies (integration of research, increase in research expenditure, involvement SMEs); positive impact on health status of the European society; positive contribution to the quality of life of Europeans; addressing the consumer concerns over food safety.
- Potential for future growth: Growth will occur through a transition to the development of new, high added-value products, the exploitation of new technologies and the more effective demonstration that technological development will bring consumers real benefits.
- Competitiveness: European competitiveness must be strengthened through exploitation of the existing high quality European foods to meet the needs of expanding markets, and which will have a major impact on well-being and welfare. Excellence and innovation is the key to European industrial competitiveness.
- Promotion of sustainable food production: Multiple stakeholders will be brought together through a common vision and Strategic Research Agenda. This will prevent fragmentation, contribute to an increased sustainability of the European agro-food sector, guarantee transdisciplinarity, and facilitate the development of new business models.

The European Technology Platform on Food for Life represents a timely and unique opportunity to actively promote a better co-ordinated EU food and nutrition research activity. It will ensure that key competences within Europe's research community are extended across all EU Member States through exchange, training and dissemination.

This document describes the current situation, expected future developments and required R&D efforts and integration activities in the area of food and health. It is clear that individual EU Member States will find themselves at different stages of the development process. As a result, a spectrum of approaches, and flexibility of overall management, will be required throughout Europe, as will be communication, training, education and technology transfer.

2. Current situation

Growth and the changed retailer-producer landscape

In the developed world, organic growth in the food market has been slow (less than 1% annually) and the relative proportion of expenditure on food is declining. This situation is further compounded by the increasing bargaining power of retailers, which serves to depress suppliers' margins even further.

Two key factors play an important role in the changing food market place. Firstly, economic development, movement from an industrial economy to a service economy, brings with it new employment patterns, time-usage attributes, consumer segmentation and eating habits, all of which exert an impact on food consumption. Secondly, consumer evolution and awareness has turned a somewhat predictable body of consumers into small groups, each requiring that their own agenda and behavioural patterns (which are both more selective and less predictable) can be met by the market.

Food safety, consumers and regulatory affairs

Consumers in Europe rightly demand safe food but their trust in the market to provide such foods has been shaken by past scares that have been caused in many instances by adulteration (e.g. the dioxin crisis) or by the appearance of novel pathogenic agents (e.g. BSE). Some of these episodes have been associated, rightly or wrongly, with technological developments. Whereas consumers are able to accept that, within the pharmaceutical sector, there are risks and benefits associated with drugs, this concept still has to be widely understood in relation to foods.

The concept of risk assessment, which underpins the regulatory process, only focuses on the potential to cause harm. The concept of benefit assessment, or more appropriately risk-benefit assessment, has not been developed or applied.

If the market is to respond to an increasing demand for healthy eating, significantly greater resources will need to be invested in research, to support health claims. Sensitivity to the price of food items will also restrict what the market can deliver to the European consumer, unless some of these costs can be met by the public sector providing the underpinning scientific research that will be required.

Food and health, well-being and welfare

Health (16%) and well-being (12%) account for nearly one third of the drivers for innovation in Europe (1). These figures reflect the growing global demand from consumers for healthier diets. R&D efforts in this area will further help to fuel growth in the European agro-food industry. New products will have to fit the needs, lifestyles and incomes of consumers.

As the security of the food supply has improved, and certain food costs decreased in relation to disposable income in Europe in the last decades, consumers are consuming more energy in relation to the amount of energy expended. Taken together, these changes lead to a rapid increase in obesity and its associated health problems (type 2 diabetes, high blood pressure, cardiovascular diseases, stroke, a range of cancer types and arthritis). Scientific evidence suggests that diet plays a key role in the aetiology of these diseases both in terms of the type of diet consumed and the overall effect of increased obesity. For example, evidence suggests that 30-40% of all cases of cancer is causally-related to nutritional factors (5).

However, care is required to distinguish the share of disease attributable to poor diets and that avoidable through better diets. The latter may include chronic non-infectious diseases with links to diet, such as cardiovascular diseases and cancer, and those that may not kill but nevertheless are costly to health services, such as dental disease and hypertension. Deficiency diseases, such as those related to deficiencies of iodine and iron, remain widespread in parts of Europe, including sub-populations in Western European countries (5).

Population-based nutrition programmes are required to translate population targets into practice. Such programmes include measures ranging from specific advice on healthy lifestyles to controls over food labelling, health claims and advertising. Messages supporting healthy eating need to be consistent, widely accepted and promoted by all stakeholders. Existing measures appear to have been largely ineffective and new ideas, backed by and tested through sociological research are essential.

Traditionally, nutritional goals have been set at population level but genomic technologies are revealing that the balance of risk/benefit will vary according to phenotype, and that there will be differing requirements for sectors of the population, including ethnic and immigrant groups, whose situation has been hitherto inadequately addressed. It may well be that foods of benefit to some sectors of the population offer reduced benefit to others. There could be an increasing development of specialised food products above those already classified as 'foods for specific nutritional purposes'.

The health of the ageing population of Europe

The European population is ageing and future changes in both population demographics and life span necessitate a 'healthy ageing' approach. Healthy behaviour is related not only to a higher chance of survival but also to a delay in the deterioration of health status. Ideal healthy ageing is described as a situation in which people survive to an advanced age with their vigour and functional independence maintained, and with morbidity and disability compressed into a relatively short period before death (6). People in their 50s and above have special needs, in particular dense food products, and an interest in their health and appearance. These concerns will be reflected in their choice of foods. The food and drink industry must thus produce innovative foods high in nutrients which, in combination with a healthy life style and compliance with advice for healthy ageing, will improve the quality of life and add life to years.

Within the EU alone, the number of people aged over 80 years is estimated to increase by about 30% over the next 50 years (5). Because life expectancy is increasing, a larger proportion of the population is older. For a variety of physical, social and psychological reasons, older adults are likely to confront a variety of nutritional problems and actively seek dietary solutions through the purchase of appropriate products.

Food chain management and environmental issues

The management of the food chain requires cross-disciplinary competences and represents a significant challenge for the future agro-food sector. Through the utilisation of new technologies and business practices, all aspects of economic efficiency, marketing and environmental control must be considered and fully integrated in order to ensure high quality and safe food for the consumers. Environmental issues, especially the need to develop farming methods that are sustainable in the long-term, will have an increasing impact on food production[3] .

The changing function of food demands the shift from supply-driven markets to demand-driven markets. Changes in food regulation and economy seek the use of new and reliable strategies and ways of communication between the various and complex food value chains. The consumer interest in quality and variety demands the choice between a broad range of food products and consumer acceptance of the new food is the final criterion for a successful market introduction. Accordingly, it will be necessary to take into consideration the consumers' point of view at every stage of food product development, processing and marketing (the 'fork-to-farm' perspective).

R&D is needed to move forward

The agro-food industry in Europe is facing an uncertain future. Not only are there demographic constraints that are limiting the growth of existing markets (declining birth rate, ageing populations etc.), there are growing societal concerns about the long-term health effects of diets.

Other issues that require a concerted action and demand new, joint collaborations, such as public-private partnerships in research to maintain a global, competitive position of the EU agro-food industry include:

- Consumer demand for high-quality, tasty foods;
- Consumer demand for safe foods, where increasing regulation of products is having a negative impact on innovation;
- The specific problems of locally-based companies and SMEs that require incremental innovations (packaging, shelf-life, processing);
- Improvements in technology transfer to translate research results into innovative products or processes;
- New developments in scientific research and technological advances in food processing;
- Opening of borders and agricultural developments have led to a changing retailer-producer relationship. Agriculture and food must be fully integrated within the political, social, economical and cultural dynamics of society.

In order for the sector to advance, targeted, transdisciplinary research is needed, that will require the support and commitment of diverse stakeholders and an increased investment in R&D.

3. The vision

The vision of the ETP on Food for Life is that an effective integration of strategically-focussed, trans-national, concerted research in the nutritional-, food- and consumer sciences and food chain management will deliver innovative, novel and improved food products for, and to, national, regional and global markets in line with consumer needs and expectations. These products, together with recommended changes in dietary regimes and lifestyles, will have a positive impact on public health and overall quality of life ('adding life to years'). Such targeted activities will support a successful and competitive pan-European agro-food industry having global business leadership securely based on economic growth, technology transfer, sustainable food production and consumer confidence.

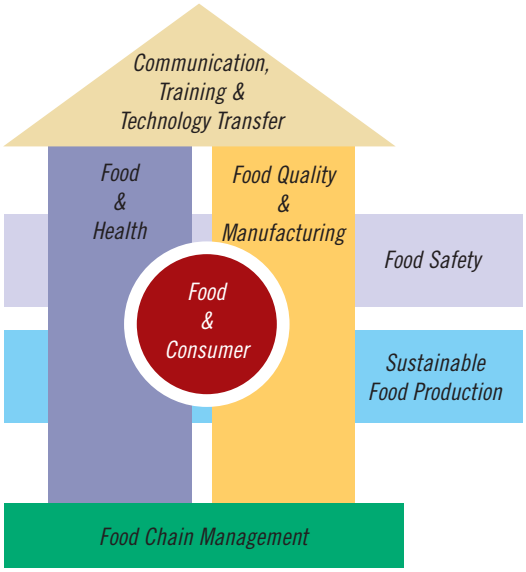
The development of a European Technology Platform (ETP) on Food for Life, bringing together the industry, both large and small, their supply chains and associations, the research community, regulators, consumer bodies and representatives of the European Commission, will enhance the well-being and welfare of the European consumer by increasing and focussing the R&D investment and promoting innovation in this important sector of the European economy.

This Platform assumes the 'fork-to-farm' philosophy, i.e. consumer demands will drive the R&D and innovation needs. Attention is specifically devoted to the development of new products and processes in the post harvest chain, since most consumer value is expected to be added at this stage. However, research requirements may involve, where relevant, aspects of primary production - for example, the development and supply of raw materials possessing specific health- or quality properties. It is self-evident that the total food chain has to be considered where issues of food safety, sustainable food production and food chain management are concerned. In all cases a close contact is foreseen with other related ETPs, such as Plants for the Future, Global Animal Health, and Future Manufacturing Technologies; close links will be fostered with ongoing and new FP6 Integrated Projects, Networks of Excellence, STREPs and Co-ordination Activities having an impact on the activities of this ETP.

Key technology priorities

To improve the quality of life of Europeans and underpin the growth and competitiveness of the agro-food industry by innovation, six key interacting areas are proposed: Food and Health, Food Quality and Manufacturing, Food and Consumer, Food Safety, Sustainable Food Production, and Food Chain Management (see Figure 3). These areas will be supported by effective strategies for Communication, Training and Technology Transfer. The forthcoming Strategic Research Agenda will include details of the main research issues to be addressed for each area.

Figure 3. Schematic presentation of the research areas required to reach the vision of the ETP Food for Life



Food and Health

Food and eating habits are the most important non-genetic contributors to age-related diseases. Consequently it is important to understand how to choose diets and foods that will maximise health benefits. It is expected that lifestyle-related diseases will increase rapidly in the next decades together with the costs related to such diseases. As a direct consequence, prevention of these diseases becomes increasingly important. Healthy diets, changing eating habits and encouraging increased physical activity, are all key determinants that will influence the rate of ageing and disease.

Focussed, collaborative food research will enable the development of innovative food products and process innovations that will make a major contribution to the well-being and welfare of the European consumers.

Food Quality and Manufacturing

Innovation not only leads to new products and production processes, but is also an important determinant of productivity improvements and economic growth. Often innovation occurs when there is interaction with different research areas, but this demands effective and timely communication.

New innovative manufacturing technologies providing high quality, novel or modified, healthy products with improved, attractive taste and convenience will enhance the competitiveness and growth of the European food sector.

Food and Consumer

It is of paramount importance to address consumer needs and to understand how the healthy choice could be made the easy choice and to act on this knowledge. Much effort will be required to understand consumer attitudes, preferences, expectations and demands and to provide effective communication to the consumer and to obtain an active interaction with consumers. In this context it is important to realise that the term 'European consumer' embraces not just main-stream populations, but also ethnic and immigrant populations, whose eating habits and diets may vary considerably and are currently only relatively poorly examined.

In addition to these discriminators of research, qualifiers were identified, as follows:

Food Safety

The continued attention and commitment to ensuring food safety is, of course, a prerequisite. All new developments have to comply with current and future expectations regarding the safety of the end product and the protection of the consumer against any threat to his or her health and well-being on a short- and long-term. This implies that new technological developments have to be assessed thoroughly with respect to the possible introduction of undesired side-effects of microbiological, toxicological or physical nature.

Sustainable Food Production

A sustainable food supply underpins the most basic requirements for quality of life. This Platform seeks to profitably provide European citizens with safe-, high-quality, health-promoting- and affordable foods whilst meeting the increasing demands for sustainable food production as perceived from the economic-, environmental-, and social perspectives. Co-operation and interactions between individual ETPs will be a necessity in addressing these issues.

Food Chain Management

In addition to food quality and sustainable food production, food chain management examines the complexibility of the different food value chains (bread, pasta, meat, milk, etc.). Due to its complexity, all participants and processes in the manufacturing of a food and all management factors such as safety, quality and efficiency need to be studied in a management system simultaneously. This will require an overall integration of consumer-added value characteristics for each individual process in the food chain.

Communication, Training and Technology Transfer

Communication, training and technology transfer will be particularly directed at SMEs, ensuring that developments in R&D will be effectively accessed by this sector.

Improvements in communication, technology transfer and networking, taking advantage of new technologies and management practices, will be of enormous importance in developing durable co-operation between enterprises, and also across food process chains (including the consumer).

The Strategic Research Agenda will also include additional measures, such as those involving regulatory affairs. It was recently recommended that there should be one body in each country, with overall responsibility for dissemination of agreed EU policy and education, to ensure consistent and correct presentation of all messages on food, so that consumers are not mislead or confused (7). The ETP will work closely with such bodies and contribute to future discussions and debate on this issue.

SMEs

Small- and medium sized enterprises (SMEs) are central to job creation and economic growth in the European agro-food industry and will be crucial for its future success; they represent a key component of both the innovation system and the chain that transforms knowledge into new food products and processes. As a consequence, this ETP puts strong emphasis on the interests of, and opportunities for, SMEs across the European Union. Strategies for improving the communication and understanding of R&D know-how and implementing processes for proactive technology transfer will be developed, delivered and disseminated. The need to improve the ability of SMEs, in particular, and industry in general, to exploit knowledge and innovation is not confined to the food chain but many SMEs in this sector are technologically unsophisticated.

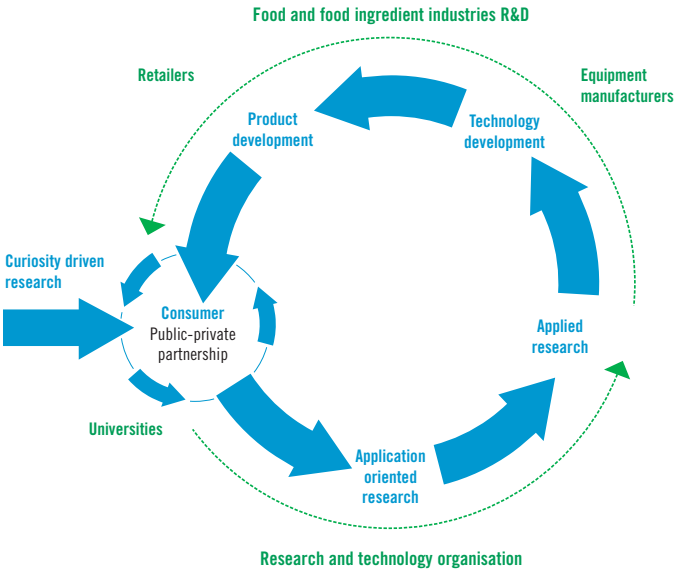
This Platform will, therefore, interact closely with trans-national networks and intermediary organisations charged with facilitating links between industry and SMEs and the research community so as to optimise exchange of information and experience; fully integrate SME-opinion within ongoing discussion on research agendas and encourage their involvement in public/private research and innovation projects.

The food innovation cycle

Universities, research and technology organisations and food industries all carry out research. Although the quality of Europe's basic science is comparable to that of the USA and Japan, Europe falls behind in its ability to translate results into innovative breakthroughs (8). It was specifically to address this European Paradox that the concept of ETPs has been promoted. Universities and fundamental research organisations are primarily responsible for curiosity-driven, generic and fundamental research. These activities feed the food innovation cycle (Figure 4).

Although to some degree active in fundamental research, research and technology organisations are geared towards the application of (new) technologies for problem solving or new product or process development. They complement the activities of the industry and contribute to the innovation cycle by focussing on development, trouble shooting and quality assurance. A public/private partnership, such as this Platform, can play a crucial role by integrating industrial relevance and scientific excellence. Co-operation and alignment among the different partners in the innovation cycle is required for innovation to occur most effectively.

Figure 4. The food innovation cycle



Source: W.M. de Vos & J.J.M. Castenmiller, WCFS, Wageningen, The Netherlands

An ETP to achieve the vision

To achieve the vision outlined here in a sustainable manner so as to ensure optimal well-being and welfare for European consumers, very considerable, and co-ordinated, efforts are required. A collaborative approach to establish the research agendas (targets and timeframes) in a number of priority areas of food and health research will also be necessary. Furthermore, the Platform should serve as a meeting place of persons working in all sectors of the food chain, bringing together expertise and competences from different areas and from different (cultural) backgrounds so as better to address stakeholder needs and policy delivery. Finally, the Platform must be an engine for effective communication, knowledge transfer and training on issues that are identified as priorities; in this way it will directly address the Triangle of Knowledge – the interaction and dynamic linking of Research, Education and Innovation.

The future success and impact of the EU agro-food industry must lie in the production of value-added and quality goods using technical know-how, developing its capacity for innovation and promoting its deeply-rooted food traditions to maintain and increase its share in world markets. Given the size and nature of the European food sector, achievements in this area will contribute largely to the welfare of society as a whole within Europe, and individually within Member States and to the achievement of the revised Lisbon Council ambitions.

The ETP on Food for Life will be instrumental in realising the vision by:

- Creating a platform for quicker and more effective, consumer-oriented and consumer-targeted food innovation and establishing a critical mass of resources, thereby linking with other platforms and disciplines;
- Providing a long-term vision for food manufacturing and food technologies in Europe that can enable a competitive, safe and sustainable agro-food industry;
- Delivering a Strategic Research Agenda and associated Implementation Plan for key technology areas identified, assuring industrially-relevant research projects;
- Identifying financial support for R&D from public and private funds;
- Assessing socio-economic impacts (scenario studies) of the Strategic Research Agenda;
- Creating a multidisciplinary and integrating approach to food-related issues;
- Catalysing national initiatives and improving the co-ordination of the activities of the Member States and contributing to EU policy and legislative developments;
- Providing a sustainable business model (including IPR);
- Affording an enabling environment for pre-competitive research and excellence through competition at the European level and transnational collaboration;
- Stimulating communication and education and training of persons in various disciplines, including technology transfer to SMEs; and
- Improving the well-being and welfare of the European society as a whole.

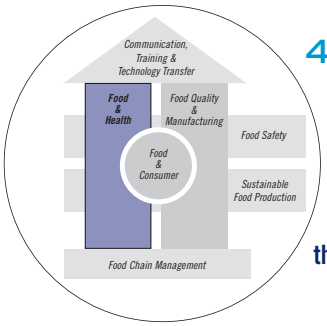
The way forward and impact of the European Technology Platform on Food for Life will include:

- Organisation of discussion meetings to reach a shared vision for a European Platform on Food for Life among a wide range of stakeholders[4] from the agro-food and related industries, agro-chemical industry, retailers, research institutes, regulators and consumer organisations. This will create an effective and sustained interaction among stakeholders. The meetings will be organised at the European level and at national level, under the umbrella of the ETP;
- Securing agreement on, and commitment to, a Strategic Research Agenda for innovative food production, the roadmap describing how this shared vision can be realised;
- Development of an Implementation Plan, an action plan for implementing the Strategic Research Agenda that will include mobilization of resources to support pan-European collaborative research, training, education and dissemination. This long-term action plan encompasses collaborative public/private R&D activities, training, teaching, capacity building, innovation management and required facilities; and
- Execution of the research proposed and prioritised by the stakeholders in the Platform (exploiting the integrated excellence of Europe's professionals) after securing R&D expenditure from industry, the EC, and national governments. This research will increase confidence in the food supply amongst European consumers; reduce national and regional health costs; contribute to food production in Europe that is economically-, environmentally- and socially sustainable.

4. Achieving the vision

The OECD has concluded that investment in, and exploitation of, knowledge remain key drivers of innovation, economic performance and social well-being. Formal and informal co-operation between institutions has become crucial for reaping the full benefits of knowledge creation and fostering the development of new technological innovations (9). Many research challenges will only be met if public and private resources are mobilised across Europe in a concerted manner.

Having identified the most important areas for the future of the European agro-food sector, research priorities can be drawn up for the middle- and long-term. There is a need to focus on the consumer as the most important element in the food chain, and to reconstruct and strengthen the chain of individual elements of the food production and distribution process from this ('fork-to-farm') perspective.



4.1 Food and health

The vision of the ETP Food for Life is that changes in dietary regimens based on developments in nutritional sciences and new innovative product formats, together with concomitant changes in lifestyle can have a major impact on improving public health and increasing productive life. These changes will contribute significantly to reducing the overall costs of health care.

Balanced diets and healthy lifestyles

A balanced diet and healthy lifestyle are both key requirements for optimal mental and physical development and performance as well as for a reduction in the risk of chronic non-communicable diseases. Moreover, their impact is exerted at all stages of human life, e.g. from the prenatal to the elderly. The addition of nutrients to foods at physiological doses or higher concentrations has led to the production of functional foods and foods for particular nutritional use. Proper communication of these nutritional benefits requires health claims that can be scientifically substantiated. The discovery and validation of biomarkers based on epidemiological studies, cellular- and physiological studies (including the outputs of systems biology) and intervention studies are all essential to this substantiation process.

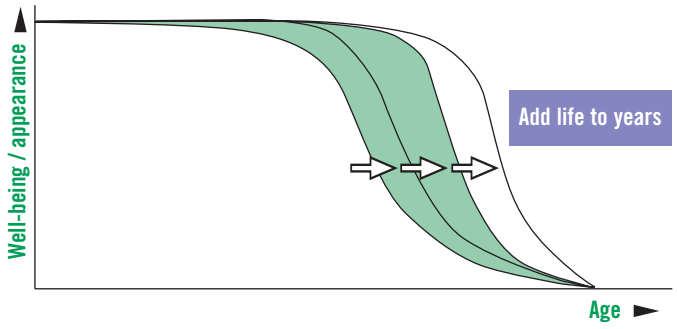
The health of the ageing population

The population of Europe is ageing - within the EU alone, the number of people over 80 years is estimated to increase by about 30% over the next 50 years. For a variety of reasons, older adults are considered to be at increased risk of nutritional problems, either as a result of impaired food intake or reduced nutrient utilisation. Healthy living is related not only to a higher chance of survival but also to a delayed deterioration of health status.

It is estimated that by the year 2030 nearly 30% of the European population will be over 60 with a concomitant increase in physical and cognitive dysfunctions.

The challenge for the long-term will be to influence an individual's state of ageing and to deliver a personal regime of nutrients, lifestyle and advice for healthy longevity - adding 'life to years' (Figure 5).

Figure 5. Healthy Ageing



Changes in lifestyle and dietary patterns

An unhealthy diet has been known for many years to play a key role as a risk factor for chronic diseases. Because of changes in dietary and lifestyle patterns, chronic non-communicable diseases – including obesity, diabetes, cardiovascular disease, hypertension and stroke, and some types of cancers – are becoming increasingly significant causes of disability and premature death in developed, but also in developing and newly-developed, countries. These chronic diseases also cause psychological- and social problems in people, reduce physical fitness and impact on the quality of life.

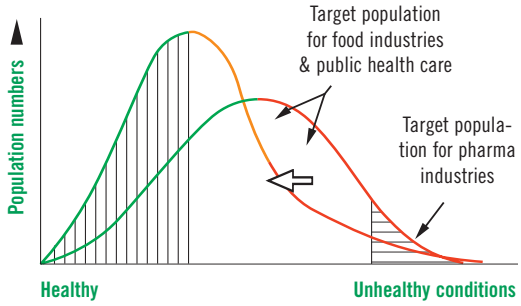
Currently, the most important dietary need in Western society is to control life-style related diseases, such as obesity and type 2 diabetes. The prevalence of overweight and obese populations has reached global epidemic proportions (20-30% in adults, escalating rates in children) (6). A sharp rise in overweight children in Western societies has been observed over the past decade. Obesity, insulin resistance, hypertension, and hyperlipidemia - collectively described as metabolic syndrome - are all major causes of morbidity and mortality in these societies. In Western European countries the associated costs are estimated to be around 5% of the total costs of health care. In addition, the indirect health costs as a result of overweight- and obese populations are about four times higher than the direct costs. A major current concern today is the increase in glucose intolerance and type 2 diabetes amongst children, mainly caused by overweight and obesity.

Proportionately very little money is spent on prevention of these diseases, which is one of the targets for the agro-food industry (Figure 6). Emphasis should be placed on preventing these diseases by delaying the initiation process; that is, preventing rather than curing.

The rapidly increasing burden of chronic diseases is a key determinant of global public health. Unhealthy diets, physical inactivity and smoking are confirmed risk factors for chronic diseases. Prevention of disease in large populations, through relatively small reductions in blood pressure and blood cholesterol can dramatically reduce health costs. For example, it has been demonstrated that improved lifestyles can reduce the risk of diabetes by 58% over four years. Other population studies have shown that up to 80% of cases of coronary heart disease and up to 90% of cases of type 2 diabetes, could potentially be avoided through changing lifestyle factors, and that about one-third of cancers could be avoided by eating healthily, maintaining normal weight and regularly exercising (10).

Thus, the public health approach of primary prevention is considered to be the most cost-effective, affordable and sustainable course of action required to address the chronic disease epidemic worldwide and in Europe.

Figure 6. A schematic presentation of improving population health - Target areas of the food and pharma industries in public health



Source: Green MR and van der Ouderaa F, Nature Pharmacogenomics, 2003

Diet-related diseases: the principle health burden in Europe

It has been calculated that chronic diseases comprise approximately 60% of the 56.5 million total global deaths in 2001. Almost half of these are attributable to cardiovascular diseases; however, obesity and diabetes are also showing worrying increases, not only because they already affect a large proportion of the population but also because they have now started to appear earlier in life. It has been projected that by 2020 chronic diseases will account for almost three-quarters of all deaths worldwide, and that the majority of deaths due to ischemic heart disease (71%), stroke (75%) and diabetes (70%) will occur in developing countries. On a global basis, 60% of the burden of chronic diseases will fall on developing countries (10).

Conservative estimates suggest that about one third of cardiovascular diseases is related to inappropriate nutrition, although the need for more research is widely acknowledged. Cancer kills about 1 million adults per year in the WHO European Region. As with cardiovascular diseases, inappropriate diet causes about one third of all cancer deaths worldwide (5).

A preliminary analysis from the Swedish Institute of Public Health suggests that 4.5% of disability adjusted life-years (DALYs) is lost as a direct result of poor nutrition in EU Member States, with an additional 3.7% and 1.4% due to obesity and physical inactivity, respectively. The total percentage of DALYs lost related to poor nutrition and physical inactivity is therefore 9.6% (11).

Relationship with other key research areas

There is a need to develop food and nutrition policies, which protect and promote health and reduce the burden of food-related disease, while contributing to socio-economic development and a sustainable environment. Major objectives of the health sector are to promote health through a well-balanced diet, the avoidance of nutritional deficiencies and the control of food-borne diseases. A multisectoral approach, embracing agriculture, the environment, the food and drink industry, transport, advertising and commerce is, therefore, essential to help position food and nutrition policy high on the political agenda.

Improvement in health should be an expected outcome from food and nutrition policies and should contribute to the success and profitability of the relevant commercial sectors. Close collaborations between those responsible for nutrition, food safety and food security will be necessary to develop comprehensive, intersectoral policies and effective concerted actions.

The exploitation of advanced, genomic technologies is likely to have a significant role to play in delivering the objectives of this Platform.

The market for functional foods

Health aspects will have to be considered for all foods, but there is a growing market for specific, new- and adapted-, common functional foods, for example phytosterol-containing food products. For example, in The Netherlands, approximately 165 million euro is spent on this market annually; a figure that is expected to double over the next five years. Specifically, the global market for weight management products is growing significantly from about 32 billion $US in 2000 to 55 billion $US in 2006. It is foreseen that the current niche-type market will expand substantially into a market possessing a broader range of innovative health food products.

Food, nutrition and research

Market leaders in the international food and drink industries recognise the importance of improved disease prevention, which would significantly reduce the enormous burden that diseases place on individuals and their families, the national and regional economies, and society at large, and they are willing to invest in substantial long-term research efforts. They have also recognised that critical mass is a key issue in securing and then maintaining a leading role in global food and nutrition research.

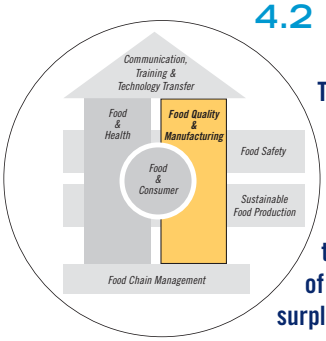
Mapping the human genome and the establishment of a range of new tools within the genetics and genomics research areas are providing the potential to revolutionise our understanding of (mechanisms of) nutrition and well-being.

The consumer plays a central role and we should, therefore, understand more fully how the healthy choice could be translated into the easy choice.

Research topics will include:

- New and effective food-based strategies to optimise:
  - ☞ Children's growth and mental development;
  - ☞ Lean body mass in adults, including maintenance of muscle function and prevention of obesity;
  - ☞ Immune function and mental performance;
  - ☞ Healthy gastro-intestinal tract for improved well-being and resistance to diseases;
  - ☞ Basis of key strategic research areas in food and health: biomarker discovery and validation (epidemiology; systems biology/nutrigenomics; intervention trials).
- New and effective food-based strategies for reducing the risk of diet-related diseases, such as obesity, cardiovascular disease, type 2 diabetes, arthritis, osteoporosis and cancer.
- The influence of diet on the ageing process, e.g. energy intake.

4.2 Food quality and manufacturing



The vision of the ETP Food for Life is that new innovative manufacturing technologies, addressing consumer expectations for high quality, novel or modified products with improved and attractive taste and convenience characteristics will enhance the competitiveness of the European food sector and contribute to the welfare and well-being of European consumers. Significant and sustained R&D investment will be necessary to maintain a global and competitive agro-food complex, maximise the market share of high-quality European products and ensure a leading market position with net trade surpluses and increased employment.

'Food Quality and Manufacturing' has two aims:

- To enhance, or at least maintain, the quality of European food products at a high level through intelligent solutions, and thereby increase their attractiveness to the consumer relative to products from other parts of the world, especially the US and Asia. This will stimulate internal growth of the European market.
- To manufacture European products possessing global attractiveness. Prices for agricultural produce from Asia and South America will drop, while overall consumption will increase worldwide. Hence, in addition to a sustained attention to competitive low cost processing, European food producers and manufacturers will need to find ways to add value to their products. The rich and diverse European cuisine allied to the leading position of European manufacturers of novel processing technology sectors offers obvious opportunities to increase the global competitiveness.

Understanding of the concept 'Food Quality' in Europe has changed significantly over the years. From the basic availability of food, via uniformity, food safety, and production circumstances, food is now increasingly associated with enjoyment, health and anticipated well-being. Changes in society and demographic development (increased participation of women in the workforce, smaller families, increased households, ageing society and increases in proportion and integration of ethnic groups in many EU Member States) have all impacted significantly on the ways in which food is currently prepared and where it is consumed.

In addition to the importance of the health effects of food, taste remains a crucial factor in securing the consumer's preference and ensuring repeat purchases. Moreover, taste is an enabler that facilitates the intake of healthy products. Convenience is another obvious factor that plays an important role; indeed this characteristic was associated with the highest growth rate in innovation in 2004. Grazing, eating on the move, ease of container-opening for children and the elderly are other examples of demands that increase the enjoyment of food. Food is increasingly consumed away from home, in canteens, catering establishments and restaurants. Nevertheless, an EU survey found that 25-33% of consumers consider that the quality of food products has deteriorated over time (12).

Changes in eating habits in conjunction with a clear demand for improved quality food create opportunities for primary producers to add value to their produce and for the food processing industry to develop new and personalised foods. Diversity will be of key importance for future food production and product developments; the latter by itself will be insufficient to create the required innovations. Increased R&D investments are necessary to develop new process equipment, processing lines or distributed manufacturing systems.

On the one hand, exporting traditional, regional products from the rich and diverse European cuisine, will be enhanced and supported through longer shelf life, obtained with mild preservation technologies provided by the leading European equipment manufacturers. On the other hand, new products will appear on the market based on novel ingredients and processes. New (natural) ingredients could be produced by improved, mild separation technologies, or by novel bioprocessing schemes. New structures and textures will be produced as a consequence of developments in micro- and nano-technology.

A challenge for the European food and drink industry over the next one to two decades is how to provide the consumer with the type of food that he/she likes at the right time and in the right place. Innovative processes, value-added products, new marketing concepts, novel ways of selling products and novel ways for the production- and supply chain to co-operate to create products targeted at consumer needs should ensure that the consumer is provided with safe products possessing the required taste characteristics and at maximum convenience - and always at an acceptable price. Modern technology can make an important difference in increasing the accessibility of food, both in terms of its availability and its affordability.

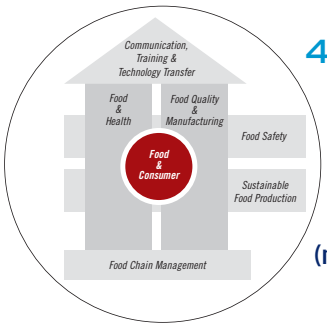
Research topics will include:

Perception of taste

- Technologies to drastically reduce sugar, salt and fat levels in food products without compromising sensory properties.
- Understanding the dynamics of sensory perception from receptor to brain, including cross modal interactions of the senses, flavour release and structure breakdown.
- Technologies for new products and meal concepts with attractive sensory characteristics for specific groups such as children and the elderly.
- Technologies to create novel, exciting food product textures based on the concept of dynamic structuring and breakdown.

Manufacturing

- Technologies for minimising by-products and waste production.
- Rapid analytical on-line methods to measure required properties of supplied raw materials.
- Sustained attention to competitive low cost processing.
- Innovation in and industrialisation of regional gastronomy.
- Technologies for flexible packaging process systems and active, intelligent and convenient packaging systems.
- Integrated production and process design.
- Technologies for flexible, distributed and miniaturised processing systems to cope with personal demands as well as hygienic and minimal processing systems for optimal quality.
- Bioprocessing and improved separation technologies for novel ingredients.
- Technologies for convenience foods: easy to handle, time saving, ready-to-eat and heat-to-eat.



4.3 Food and consumer

The challenge for the ETP Food for Life is to more fully understand consumer food choice behaviour and to stimulate the consumers' selection of foods in order to arrive at a healthy diet ('to make the healthy choice the easy choice'), and to create trust and confidence in food production, service development and consumption of (novel) foods.

Consumers play a central role in the European Technology Platform Food for Life and their interests should be reflected across all the research sub-Platforms. Food and drinks brings pleasure to living and, if consumed in the right amounts and proportions, they should make a major contribution to the well-being and healthy ageing of European citizens. Consumer confidence in foods and drinks is also of paramount importance and is related to product safety, product supply and new technology. The logic and understanding of consumers may differ considerably from that of experts and when ignored this discrepancy may lead to misperception, misunderstanding and ultimately distrust and thereby hamper the effective communication to realise desired behavioural changes.

Improvements in the health of European consumers, including ethnic and immigrant populations and other specific target groups (such as children, elderly and the disadvantaged), can only be realised through changes in consumers' food choice and dietary habits, which take account of current and emerging lifestyle choices. Understanding and appreciation of these cultural and lifestyle factors may further enhance the effectiveness of the European food and drink industry.

'Food and consumer' has the aim to develop fundamental understanding of consumer food choice behaviour in an actionable format to include progress made in nutritional sciences, food quality and food technology. More specifically this research programme aims to:

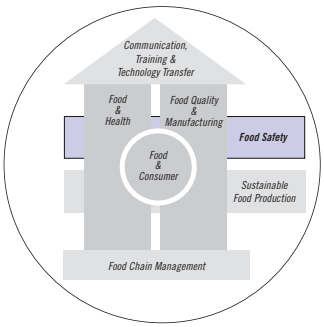
- Understand the consumer food-related perception process and particularly where discrepancies occur between consumers and experts which may lead to lack of confidence;
- Understand consumer food choice processes and the underlying fundamental processes;
- Understand the process of behavioural change and the key factors that drive, facilitate and inhibit such change in a more healthy and sustainable direction; and
- Understand fundamental food values, food cultures and eating habits with their diversity and dynamics across Europe.

Key elements that must be addressed include:

- Consumer priorities for and trade-offs between various food benefits such as taste, convenience, health, sustainability, price and ethics as well as the dynamics in consumer benefits needs (hypes and trends);
- In-depth analysis of specific target groups such as children, elderly, ethnic and disadvantaged consumers together with appropriate methodologies and intervention tools for these target groups;
- Consumer-focussed communication strategies on the benefits, risks, safety, and healthiness of specific dietary choices, as well as on the origin of foods;
- Informed intervention strategies for behavioural changes towards more healthy and sustainable food choices;
- Effective consumer-focussed communication strategies to promote food choices for specific target groups (e.g. children, less-educated consumers, elderly); potentially evolving into a health marketing curriculum;
- Consumer-focussed information and labelling schemes to enhance food choices;
- Effective (school) education programmes to enhance knowledge about and motivation for food choices;
- Consumer trust and confidence in product origin and product technology, and developing the underpinning science base;
- Consumer inputs into strategic developments in food technology and product development;
- Consumer perceptions, attitudes, preferences and behaviour towards new technologies (e.g. nanotechnology, genomics, etc.), specific production methods (e.g. animal welfare, local specialties, organic and sustainable production) and dietary regimes (e.g. vegetarianism, dieting, etc.); and
- Improved methodologies to incorporate consumer focus, involvement and alignment in food innovation ('fork to farm' approaches).

Research topics will include:

- Understanding and predicting food selection for a healthy diet, and stimulating a good habitual consumption of foods. This might include developing personalised information and products optimising quality and consumer health and the prediction of future trends at the global, EU, regional and local level.
- The design and validation of new ways to effectively communicate and target information on healthy diets at various population groups with different information needs, including minority ethnic populations and those most at risk.
- Mapping the dietary habits of ethnic and immigrant populations in Europe and effectively exploiting this new knowledge.
- Mapping food culture in Europe and in the global market.
- Analysing the role of price versus other food benefits and how this differs between specific target groups (e.g. low income consumers).
- Consumer-controlled product development; models and techniques for translating consumer information into sensory and non-sensory product specifications.
- Understanding the determinants of consumer acceptance of food technologies, and how this varies according to individual consumer benefits. Are new technologies the answer to the demands and health requirements of consumers? What is the best strategy for the food industry to adopt when using technology applied to product innovation?



4.4 Food safety

The vision of the ETP Food for Life is to ensure the production of safe foods that consumers can trust.

Although our food is now safer than ever, consumer perception has shifted to a high level of awareness and reduced certainty. In essence, decision-making for the consumer is based on 'food you can trust'. This relates to the elements of honesty (*"can I trust this company, brand or origin?"*), familiarity (*"what does the label mean?"*), quality (*"is it fresh?"*), naturalness (*"what was added?"*) and food safety (*"does this food not damage my health, now or in the future?"*).

Food safety continues to be a priority issue for government, industry, academia and the consumer. Safety scares and incidents relate to (micro)biological (e.g. Campylobacter, Listeria, noro-viruses, BSE), chemical (e.g. crop protection agents, veterinary pharmaceuticals), physical contamination and allergens. Food scares may relate to animal diseases that have no direct relation with food safety themselves (food and mouth disease, avian influenza). Food processing is now a global industry and, therefore, the consequences of contamination can be potentially very widespread, causing harm to human health and damage to the credibility of manufacturers, regulators, and ultimately to the reputation of processed foods.

Consumers also desire natural, functional, nutritious foods that are unquestionably safe. An apparent constraint here is that most preservation and processing technologies used today also cause loss of naturalness and nutritional value. The introduction to the market of alternative processing technologies or novel foods, requires consideration of possible consequences within the food system. For instance, more minimally processed foods will become available to comply with the consumer demand for more 'fresh-like' convenient products but the risk of food spoilage could increase.

Most of the novel processing technologies carry the promise to deliver safe foods without sacrificing naturalness and nutritional benefits. It is to the advantage of the consumer and the agro-food industry, therefore, to fully exploit these scientific breakthroughs so that the safety and nutritional benefits of processed foods can be enhanced significantly. Proper validation of a range of alternate and novel technologies is, however, needed. Hazard analyses must consider all the intrinsic and extrinsic conditions that influence chemical and pathogenic contamination known to be associated with foods, ingredients or processes related to the novel food being introduced.

There have been some very significant scientific and technological advances that allow a better understanding and prediction of the behaviour of food-borne micro-organisms, and to deliver safe processes that are milder. A variety of powerful tools, based on molecular biology and genomics, are available to characterize micro-organisms and also to offer more rapid ways of detecting these organisms. This will provide new insights into the basis of human disease, the source of pathogens in food and the capacity of pathogens to resist stress, survive and grow in diverse environments, and lead to new strategies to control and eliminate pathogenic bacteria from the food chain.

The micro-ecology of foods is itself a rapidly developing field, which makes great use of modern technologies to describe the complex interactions occurring in foods. The science base, which these studies represent, will be crucial in the support of risk assessment and risk management tasks.

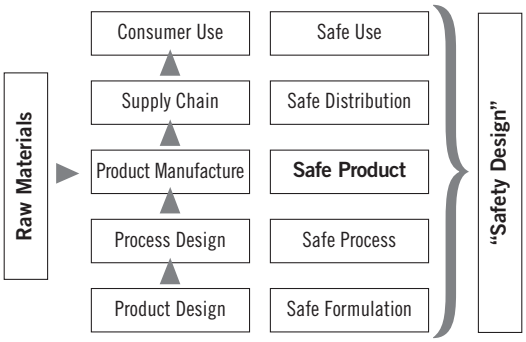
Understanding the established causes of bacterial food-poisoning will provide insight into microbial evolution and this insight will provide the tools to develop models for the prediction and containment of emerging causes of food-borne disease for the future. These 'systems' approaches promise to help us understand micro-organisms and their interactions more deeply than ever before. Nonetheless there remains the need to develop tools that will enable the rapid detection of food pathogens in situ and that are capable of being used on- or off-line within the time frame of a typical production run.

Safety, however, is not guaranteed only by 'safe' product manufacture; the total chain has to be taken into account. Professional practitioners in the food safety arena need to have the proper decision-making tools to develop the correct procedures that ensure the safety of foods throughout 'fork to farm' (which can be translated into 'research to retail'). A systems approach 'safety by design' (Figure 7) has to be taken into consideration, which relies heavily on risk assessment and risk management and tools for detec-

tion and prediction. These tools are based on the assessment of the real risks in the food chain. Superior scientific and technological knowledge makes such risk assessments effective, robust and 'real-world'.

Quantitative risk assessment will consolidate its role as the cornerstone of how society responds to environmental (including food) hazards. Even though full quantitative risk assessments will remain in the domain of EU-wide, official agencies (such as EFSA), the tools which are being perfected within this discipline (e.g. predictive models) will continue to represent important competitive instruments, underpinning the innovation process in the development of novel products. Research in this area will be important both to develop the science further and to make these tools more widely available within the food industry. The tools and methods which are developed should be adapted to the complexity with which foods are currently being viewed; for example, undertaking risk/benefit assessment, rather than just risk assessment and considering hazards in combination rather than separately.

Figure 7. Systems approach: safety design



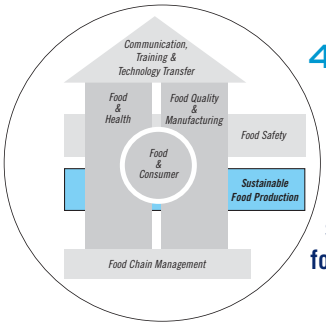
The safety of food and food products, as well as their ingredients, is currently supported by data generated from animal tests; approaches that are the focus of growing public disquiet and concern. Recent advances in gene technology supported by mathematical sciences and computer technology have resulted in the rapid development of genomics, transcriptomics, metabolomics and proteomics. This situation, together with a systems approach might contribute to addressing the consumer concerns for a drastic reduction in the number of animals used. It is reasonable to assume that these new developments and applications will serve to meet the demands and expectations of society and also improve the quality of overall risk/benefit assessment. However, it will be vital for society to be informed about these changing scenarios.

Education and effective risk communication will be necessary to provide consumers with a more accurate perception of food safety risks and to encourage behaviour modification, where needed. Food safety objectives will be defined per product (range) and new methods for risk assessment will provide information on the level of risk. The latter can be used to classify foods in safety classes and to label these accordingly.

Promoting research and knowledge development in this broad area should, therefore, be a significant objective of the food safety strategy. This then allows the agro-food industry to develop the proper risk mitigation tools.

Research topics will include:

- A 'systems' approach for improved food safety and reduced food spoilage, including the development of integrated processing and packaging solutions; a holistic approach of safety of cooked foods; understanding shelf life.
- Methods of quantitative risk assessment and predictive modelling of safety and spoilage risks along the extended supply chain, including product and process design models, novel detection routines and the impact of cold chain.
- Reliable tracking and tracing systems to ensure product safety and guarantee product origin.
- Epidemiology and surveillance – not only strengthen and broaden surveillance networks (e.g., Enter.Net), but also develop scientific predictive insight into how pathogens survive and disseminate.
- Food-borne micro-organisms and their ecophysiology; community interactions, host-microbe- and food-microbe interactions, pathogenicity and virulence mechanisms using functional genomics.
- Viruses, parasites and emerging pathogens – molecular mechanisms of emergence.
- New technologies – development and complete validation.
- Research on consumer perception of food safety.
- Reduction and eventual elimination of all animal testing in food safety.
- Cleanroom technology.
- Holistic approach to the relation between processing and food safety, including cooking.

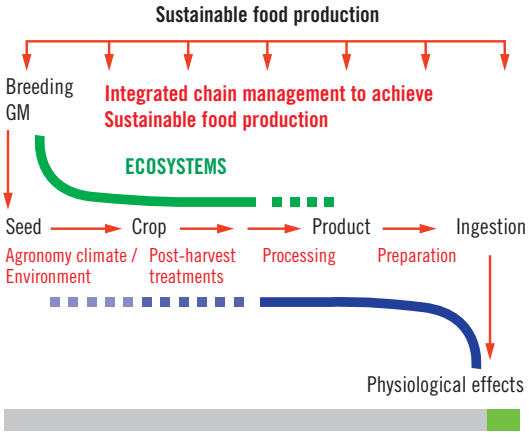


4.5 Sustainable food production

The vision of the ETP Food for Life is to create greater synergy between economic growth, environmental protection and fair-minded social conditions in order to improve welfare and well-being of the European citizen. Benefiting all in Europe, a sustainable agriculture and food production is a worldwide challenge and regards food chains as a whole.

Sustainable development, development that meets the needs of the present without compromising those of future generations, is a central objective of the European Commission, as confirmed by the Treaties of Amsterdam and Nice and emphasised at the Gothenburg Council.

Figure 8. Sustainable food production along the food chain



Source: K. Waldron, IFR, UK, 2004

Within this ETP, sustainable agriculture and food production, like food safety and food chain management, is seen as underpinning all issues addressed within the Food and Health, and Food Quality and Manufacturing pillars. Sustainable food production includes food chains as a whole: the suppliers of inputs via primary producers, processors, traders, retailers and the consumer. Climate change, nature and biodiversity, health and quality of life and management of both natural resources and waste streams are all areas in which particular attention needs to be focussed in future years (13). Cross-functional co-operations between industrial sectors outside the agro-food industry will increase. The objectives of the Environmental Technologies Action Plan (ETAP) will, therefore, be of central importance in the development and implementation of the ETP.

Although much effort has already been spent in the Western world towards creating sustainable production systems, the European agro-food industry has a global responsibility, since its resources are not limited to those from Europe. The World Summit on Sustainable Development in Johannesburg in 2002 established a ten-year framework of programmes for sustainable production and consumption patterns and this ETP will also support global commitment and partnership.

Close links will be established with other Platforms and trans- and international activities so that good practice may be captured and encouraged, and that the food chain will be represented in dialogue, debate and action promoted through other channels. For instance, leading members of the European industry have joined forces to set up the international Sustainable Agriculture Initiative Platform (SAI Platform) to promote and develop sustainable agriculture and communicate its benefits worldwide. The ideas of the SAI Platform will have a significant input into the development of this ETP:

- Knowledge building and management using databases on sustainable agriculture;
- Supporting the implementation of sustainable agriculture practices including the position of small growers in developing countries;
- Raising awareness by public relations; and
- Involvement of different stakeholders with an interest in the food chain.

Although sustainable agriculture and food production cannot be restricted to a European level, the ETP will emphasize activities to promote the competitiveness of the European agro-food industry:

- To create the necessary synergy between economic growth, environmental protection and fair-minded social conditions, effective actions must be taken to remove economic, regulatory and technological obstacles. Whilst the dismantling of regulatory barriers is beyond the scope of this Platform, its stakeholders are fully committed to this end and will work with others to achieve this.

- In the development of new, tasteful and convenient products it will be important to exploit novel processing technologies whose use is more environmentally-friendly than current alternatives. These encompass technologies and processes to manage pollution (e.g. air pollution control, waste management), products and processes that are less-polluting and less-resource intensive, and ways to manage resources more efficiently (e.g. reduced water supply, energy-saving technologies). In many of these areas, European industry stands at the forefront of developments and their application and exploitation will offer competitive advantages for products and services, significant market growth and opportunities to further strengthen the European R&D base.
- Social science research will explore how agronomic, financial and social policies and practices affect the sustainability of the food chain, and how individual actors and groups (including the stakeholder community) make decisions, exercise power and respond to change. Studies and analyses will offer solutions to challenges and will contribute to formulating theories. Outputs will be targeted at local, regional, national and European level.
- To achieve a sustainable balance between protecting ecosystems and meeting human needs, to ensure that the primary production- and food industries continue to motor the European and global economy and to make even more significant contributions to health and the countryside in Europe, research will be allied to the development of new tools, models and solutions for improved food chain management practices. This includes a stronger promotion of the implementation of environmental management systems all over the food chain.

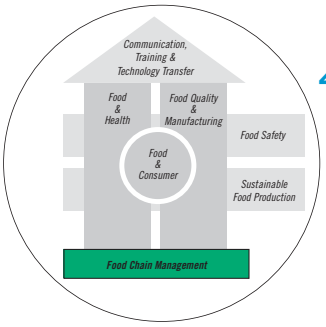
In keeping with the strategic thinking behind ETPs, education, training and communication will be pivotal in capturing the interest and support of stakeholders, thereby determining the ultimate impact of this Platform. Amongst the various avenues to be exploited are:

- Open discussions, stimulating the exchange of views and ideas on critical issues;
- Fora for scientists and the media (to facilitate interactions and promote mutual understanding);
- Activities targeted toward farmers, food processors and retailers, regulators, policy makers and opinion formers; and
- Teaching and education, in the broadest sense.

Constructive feedback from these and other activities will be used to further develop the Platform.

Research topics will include:

- Compilation of new modelling tools and indicators for operational processes in the agro-food industry in Europe.
- Description of various scenarios depending on worldwide changes in environment, economy and society.
- Life Cycle Analysis (LCA) of food chain(s) to prevent and reduce waste streams, decrease energy and water use and apply chemicals appropriately and judiciously.
- Development of value-added technologies to facilitate innovations of the EU agro-food industry in food chains (animal/meat and fish; plant/crops; microbiological).
- Advancement of farming technologies according to a diversity of farm management systems (integrated and organic farming).
- Knowledge management to identify and involve stakeholders, promote and encourage food chain sustainable development across Europe, with a particular focus on new Member States and Candidate Countries.



4.6 Food chain management

The vision of the ETP Food for Life is to achieve a competitive high level of food value chain performance through implementation of new technologies and business practices that address all aspects of economic efficiency, marketing and environmental control.

Complex food value chains encompass all participants and processes involved in food production from the suppliers of inputs via primary producers, processors, retailers and the consumer (Figure 9). The understanding of the complex nature of the food world will be based on the know-how of networks rather than simply chains. The key 'drivers' for the effective management of food value chains are:

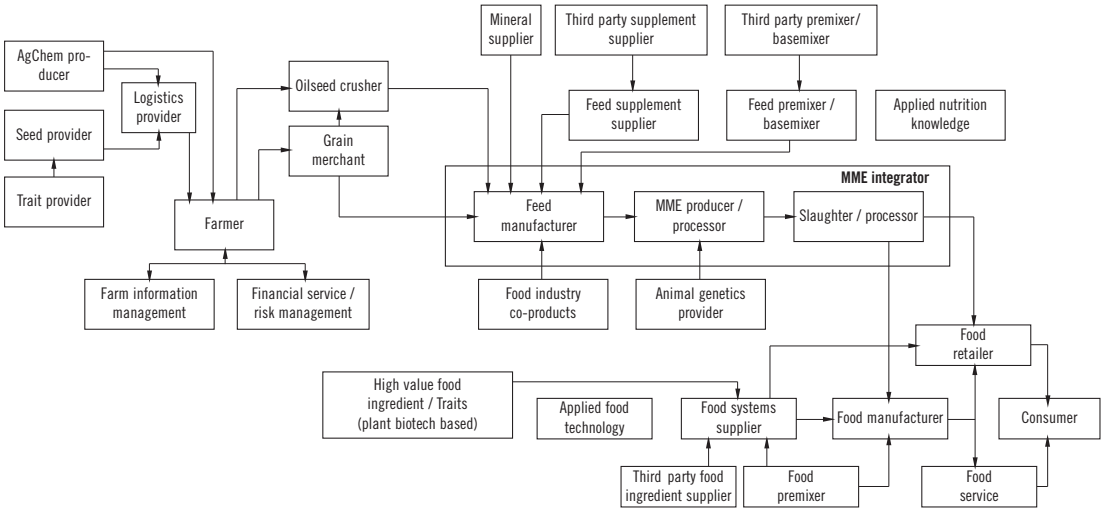
- Safety: overall legal framework, quality and risk management, traceability, brand protection and liability;
- Quality: taste, appearance, freedom from residues, nutritional characteristics, reputation, brand awareness and sustainable food production; and
- Efficiency: consistency, flexibility, lean production, specification, continuous supply, high-volume and low-cost production.

These issues affect players involved at all stages in food value chains. The aim of the future agro-food industry will be to deal with the different interests of the individual market players in respect of environmental-, ethical- and economical affairs, and to examine how best to determine outcomes that will maximise benefits to consumers whilst also providing benefits to producers. Conflicts associated with competition practices, market dynamics and legal regulation need to be resolved together with those resulting from the demands of society and public perception.

The shift of power towards large manufacturers and retailers requires specific considerations on the future role of SMEs and farmers. Since a constant increase of the global trade of food is foreseen, the mechanisms that cross cultures and economic development zones must be developed, understood and implemented.

The main future challenge will be to achieve a high level of transparency between the individual production stages and to share benefits and risks along the value chain; in this manner sustainable growth in Europe will be created. The implementation of such highly-efficient and cost-effective food quality controls can only be guaranteed by continuous advancement of increasingly sophisticated and co-ordinated systems of food chain management systems including quality-, HACCP- and environmental management and control. Finally, value chain co-ordination has to result in an extra value creation beyond the basic needs of food safety and food quality. The cost/benefit considerations of single companies must be expanded to competing chains.

Figure 9. The complexity of food chains



Such systems are based on technical tools and are derived from business processes and experience. As a consequence, individual companies will change internal processes and enter into co-operations across company borders with suppliers, customers and, in non-competitive areas, competitors. The development and implementation of these new business processes will require support from various science-based disciplines including economics, informatics and information technology, as well as involving inputs from the social and life science disciplines. The structured and focussed support afforded for such interactions by the ETP will stimulate innovative solutions. Due to the structure of the European agro-food industry, specific efforts are needed to transfer results from R&D to SMEs.

To define successfully fields of research, a deep understanding of consumers' and citizens' demands and needs should be developed. Here, policy makers and companies should be in a position to distinguish between the roles of consumer organisation and the behaviour of the consumer at the point of sale.

European leadership in both generic and applied information- and communication technologies needs to be developed and exploited in food chains and networks.

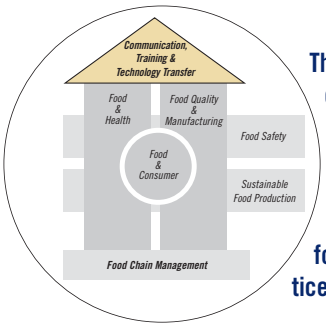
Key elements that must be addressed include:

- Increasing demands from consumers for modified innovative products and services, e.g., e-commerce;
- Increasing demand for network activity (interdependence and interplay of food chain organisation, institutional arrangements and technology);
- Influence of information- and communication technologies on inter-company transaction processing and logistics;
- Transparency of food production and risk management: new organisational and technical mechanisms for feedback, intensified communication, systems of late conversion, tracking and tracing systems;
- Transition from economies of scale to economies of scope for food-producing industry and retail sectors;
- Integration of food production management systems; and
- Worldwide demand for effective food chain management in respect of responsiveness, process- and product innovation and capturing of side effects (e.g. social responsibilities).

Research topics will include:

- Technical sciences: early and effective implementation of new generation of information- and communication technologies and data handling within the agro-food sector and adoption of new generation tools relating to production-, trade-, retail- and consumer issues.
- Business administration: business organisation, quality-, risk- and innovation management to co-ordinate intra- and inter-organisational relationships, marketing aspects.
- Institutional and industrial economics.
- Industrial engineering and production management.
- Social sciences: social aspects of trans-national networking activity, communication and organisation within value-added chains, supporting for complex problem solving in scientific, societal, agro-food industrial and business environments.

4.7 Communication, training and technology transfer



The impact of the ETP Food for Life will, to a large degree, depend on the effectiveness of the communication and training strategies developed and exploited within its programme, especially those directed toward improving knowledge and technology transfer. Best practice in communication and the exploitation of innovative communication and training techniques will be promoted and supported throughout the Platform. Transfer of technology to industry, and to the SMEs sector in particular, is the driver for innovation and is a key focus for improvement. Links with other ETPs and trans-national networks will enable best practices relevant to this sub-Platform to be identified and rapidly and efficiently implemented.

Effective communication, training and technology transfer are common elements of Research, Education and Innovation, the three components of the 'Triangle of Knowledge' recently highlighted by the European Commission (4).

Within the overall context of this ETP, communication is important among its sub-Platforms, within the management and administration structures and with and between individual stakeholders communities. Training will be needed to stimulate entrepreneurial ethos, build confidence and experience and create future generations of skilled and flexible scientists and technologists. Transfer of technology and knowledge are necessary tools for establishing the link between research results and their application. A relationship of trust and mutual confidence between individuals and organisations is a prerequisite for successful technology transfer. The structure of the ETP will serve to faciliate the development of such relationships.

Transfer of knowledge is not only realised in development of products and processes, but also through training and education of personnel. Highly-sophisticated food production processes require well-trained staff. The gap between research and its application, currently wider in Europe than for its key global competitors, must be narrowed via the exploitation of educational programmes that introduce new students and food production personnel to the most recent developments and techniques. Taken as a whole the interacting activities of this sub-Platform will contribute directly to delivery of the aims of the Revised Lisbon Council, the Innovation White Paper, the European Research Area and Framework Programme 7.

Communication

In addition to being a key requirement of effective management and administration for the Platform, communication [a two-way process] is important to optimise interactions between individual sub-Platforms, to enable stakeholders to gain the maximum benefit from ongoing activities and to ensure that policymakers, opinion formers and the general public are regularly updated on issues relevant to the agro-food industry. For this reason the Platform will organise regular seminars and meetings, will incorporate best practices in communication and will include the scientific media, and especially food writers, in its activities.

It is essential to understand that the effective communication of food-related issues depends on designing different patterns of communication aimed at capturing the diverse sensitivities and priorities of stakeholders involved in the knowledge process. Validated strategies will be adopted to ensure optimal impact across the members of the food chain and the general public. The first group includes companies and retailers, and the second, consumers (who may be further subdivided according to background, education, age and ethnicity) and opinion formers.

There is also a need for industry to improve its communication capabilities, for example by increasing the quality of information directed towards the consumer, ensuring that it is correctly targeted and that it addresses the consumers' needs and expectations.

The long-term success of the European agro-food sector will depend on skilled and flexible scientists and technologists of both genders; the Platform must:

- Publicise the benefits of a long-term and challenging career in this sector;
- Promote Europe as the foremost region for such career development; and
- Engage with other actors to raise public awareness of the positive role that science and technology plays in supporting and developing a sustainable agro-food industry, that creates employment and promotes health and well-being of consumers.

Training

All aspects of the programme of this ETP will involve training and funding schemes to support such activities will be sought at both national and

European level. The active involvement in this Platform of professional organisations will ensure that an effective exchange of knowledge and experience between academic organisations and industry will be included. The very high proportion of SMEs active in the agro-food chain demonstrates that technology transfer to this sector is particularly important; this is even more so within the new Member States where there is a particularly wide gap between researchers and companies.

Representatives from food industry networks and from single companies need to work together to develop strategies to reduce the increasing gap between countries and food sectors that exploit innovation and those that do not. One solution could be the creation, at national and European level, of 'techno-mediators' - technicans who have been trained to train other technicians; in this manner best practice of innovation awareness could be efficiently promoted. A more formalised commitment by the food sector to the training of trainers could be introduced by creating a 'European Academy' of skills and competences in food technology improvement and transfer, which might include on-job training and have recognition by the European Union.

Technology transfer

The transfer of information and results on (innovative) technologies to the agro-food industry encounters many human and technological obstacles; together these contribute to the generally slow pace at which innovation is introduced into processing plants. Obstacles to innovation are particularly significant for SMEs, especially those in new Member States, because of the:

- General resistance to take up new methods of work and innovation;
- Failure of institutional mechanisms to effectively disseminate knowledge and to inform key industrial personnel of newly available technologies and innovations;
- Lack of knowledge on how best to transfer knowledge developed in the laboratories of R&D organisations, and scale up processes that were developed and tested in the laboratory; and
- Lack of time and professional knowledge to read and understand scientific literature.

National players experienced in knowledge transfer will be invaluable partners in this European Technology Platform to ensure that the flow of knowledge is both rapid and efficient. National or regional knowledge transfer platforms have been established in a number of EU Member States and experience and best practice from these, and other, programmes will be sought and exploited. However, since technology transfer (and associated entrepreneurial activity) in Europe lags behind that of the USA and the Pacific Rim, particular attention will be paid to promoting and encouraging these practices.

Especial hurdles that need to be addressed within new Member States, Candidate and Accession Countries include:

- A significantly lower national investment in agro-food research;
- A reduced willingness of the agro-food industry to invest in and implement research because of limited financial- and human resource;
- The one-way mobility of R&D staff away from new Member States, due to salary differences and lack of career opportunities; and
- Barriers that inhibit researchers from establishing effective and sustainable links with manufacturers, a situation that exists across Europe.

Activities will include:

- Providing training and dissemination services to a wide range of stakeholders in the agro-food sector.
- Developing an effective dialogue with society.
- Disseminating new findings and research results to a broad and interested public.
- Identifying and transferring relevant best practices at all levels.
- Stimulating and promoting entrepreneurial activities.
- Identifying appropriate measures and mechanisms for training, including on the job options.
- Complementing and supporting existing channels, identifying requirements that are common to other industry sectors and supporting cost-effective joint activities.
- Integrating R&D and industrial partners in training and technology transfer, thus connecting science to industry and emphasising the importance of all partners in the food innovation chain.
- Developing new, simple methods for structuring existing fragmented information at SMEs level and making it available and easily understandable for factory personnel to improve knowledge management.
- Strengthening and improving schemes to support trans-sectorial mobility of R&D staff with special attention for mobility involving new Member States.
- Establishing associations of agro-food manufacturers and R&D organisations.
- Promoting the benefits of collective research funded by groups of SMEs especially in new Member States.
- Establishing databases for communication, training and technology transfer.
- Network maintenance.
- Personnal transfer.

4.8 Horizontal issues

4.8.1 Integrating activities: clustering and networking.

Innovation within the production chain can be achieved either within an organisation or within a collection of organisations in concert with network organisations, such as research institutes, equipment manufacturers, governments, NGOs, and financial organisations. Whereas innovations within a company usually represent incremental improvements, approaches involving different organisations are called system innovations and usually, but not inevitably, involve large step changes. Since the agro-food industry in Europe is fragmented, effective and efficient achievement through large step innovations will require the formation of new networks.

In order to be able to achieve the vision described here, clusters and networks within the agro-food industry and with the health and technology sectors (each of which commits up to ten times greater expenditure in R&D) must be built. Only then can it be expected that the success rate of European innovations can be accelerated.

Additionally, the benefit from R&D investments will be optimised if the knowledge chain is intact (i.e. not fragmented) and multidisciplinary. Hence, the R&D chain from basic research via applied research and development to innovative product exploitations should be addressed and reorganised at a European level in order to provide improved support to national and regional industry. Food innovation research infrastructures (public/private partnerships) need to be created in various EU Member States or across borders each in response to their own specific focus, consumer demand and market opportunity. A European Strategic Research Public/Private Centre should be established to support innovation and link-up with other sectors (e.g. pharma).

In the earlier sections of this document, for clarity of presentation the specific research topics were presented as separate topics. To fully reach the goals of the European Technology Platform it will be necessary to effectively integrate these topics. For example, in order for a large company or chain of food-producing companies to deliver nutritional and other life-style benefits to the European citizen through the provision of high-quality foods produced in a fully sustainable manner, a diverse range of expertise needs to be integrated. These might include consumer-driven research and design, innovative manufacturing technologies, health, medical and nutritional sciences related to life-style related diseases, sustainability in both food and non-food chains (linking the current FP6 Thematic Priorities Food Quality and Safety and Sustainability).

Activities will include:

- Clustering and networking with other initiatives: platforms; networks; and projects. Building networks with the health and technology sectors and optimising clustering in the knowledge and innovation chain.
- Providing a network for informing food-related policy makers in industry and at regional, national and EU level.
- Establishing a horizontal link between thematic areas.
- Accessing (venture) capital: especially relevant for start-ups and SMEs.
- Interacting with financial institutions and insurance companies.

4.8.2 Scenario studies

Unlike some other sectors (for example, environment, transport, aerospace) the European agro-food chain currently does not have the necessary medium- or long-term scenarios against which to plan its strategy. Such information is crucial in informing stakeholder debate and developing the decision-making process in research, social and economic contexts.

Several scenarios are presented below and it can be seen that their outcomes would not only have enormous impact on the viability of Europe's agro-food industries and the quality of life of its citizens, but equally important impact on wider areas of European policy (environment, health, transport, economic growth and prosperity, employment patterns, competitiveness and trade).

The modelling of scenarios representing the extreme and intermediate positions requires expertise not present within the food chain at present. It is proposed to carry out appropriate scenario studies, with the co-operation of individual modellers as well as the JRC Institute for Prospective Studies in Seville, and of organisations and individuals having relevant data.

Food and health

- What would be the cost (in its broadest sense) to the sector and beyond of compliance with all current and future policies and advice, e.g. in respect of health? As an example, if Europe complied with nutritional advice to eat '5 portions of fruit and vegetables a day' this would reduce diet-related illness, health-associated costs, enhance the quality of life of the workforce, etc. But if all consumers were eating this bulk, what would they not be eating as a consequence (and what would this mean for sub-sectors of the agro-food industry)?
- What would be the cost to the sector and beyond of complete ignorance of all current policies and advice?
- Developing research tools to assess the impact on nutrient intake of advice and regulatory changes regarding health and nutrition information. For example the impact on micronutrient intake in the context of actual or potential deficiencies.
- What would be the effect on the food supply chain of replacing energy-rich foods with low-energy alternatives?

Food quality and manufacturing

- What would be the cost of moving towards a diet comprising (sustainable-desirable) primary products or minimally-processed produce, or of locally-produced produce? For instance, the General Food Law may have an effect on local production. Not only on availability, but also on socio-economic aspects.
- What would be the cost/benefit of moving towards a more liberalised raw materials global market?

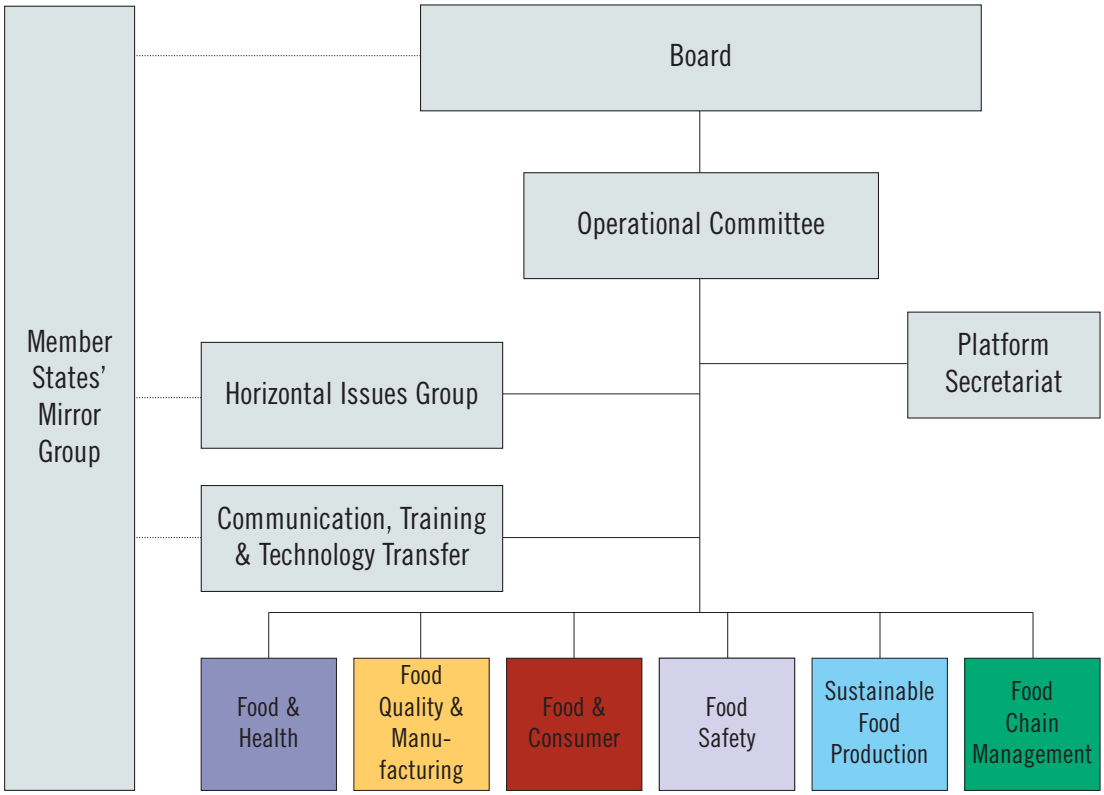
Sustainable food production

- What transitions are needed in the different sectors of the food chain to transform it to a more sustainable European food production system?
- What would be the effect on the food supply chain of achieving 50% overall production of organic foods by 2020?
- What would be the economic, social and likely health impact of implementing an environmentally-friendly and good animal welfare policy of meat and dairy product production?

5. Platform organisation

A proposed organisation of the Platform is outlined below. The overall aim of the structure is a flexible management that will maximise the impact of the various activities described within the Strategic Research Agenda and Implementation Plan. The details of the management and administrative structure will be developed following the formal launch of the Platform.

Figure 10. A proposed organisational structure for the European Technology Platform Food for Life



Endnotes

1. The European Commission has recognised the significance of the situation and recently launched the EU Platform on Diet, Physical Activity and Health: a committee of experts on nutrition and physical activity charged with advising the Commission on preparing a broadly-based strategy to support national and local efforts to confront this challenge.
2. This Vision for the ETP on Food for Life is fully consistent with the Building of a Knowledge-based Bio-economy, included in the European Commission's Working Paper on FP7, to be achieved by "*bringing together science, industry and other stakeholders, to exploit new and emerging research opportunities that address social and economic challenges: the growing demand for safer, healthier and higher quality food and for sustainable use and production of renewable bioresources; the increasing risk of epizootic and zoonotic diseases and food-related disorders; threats to the sustainability and security of agricultural and fisheries production resulting in particular from climate change; and the increasing demand for high quality food, taking into account animal welfare and rural contexts.*"
3. Sustainable production technology is among the subjects of the ETP Plants for the Future. Close co-operation with the ETP Plants for the Future is envisaged.
4. The approach of this ETP assumes the 'fork-to-farm' philosophy, meaning that the chain starts with the consumer. It is evident that innovation is required across the entire food production chain. Thus, close contact will be established with other related ETPs, such as Plants for the Future, and Global Animal Health, and other initiatives.

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Persons working with the following organisations, companies or institutes provided input to the Vision Document:

ACTIA, France
AGROCOMEX Sp., Poland
Agriconsulting Europe, Belgium
ANIA – Association Nationale des Industries Alimentaires, France
Bayer CropScience AG, Germany
BASF, Germany
BEUC – The European Consumers' Organisation, Belgium
Campden & Chorleywood Food Industry Development Institute, Hungary
CARTIF, Spain
CEBAS – CSIC, Spain
Central Food Research Institute, Hungary
CIAA – Confederation of the Food and Drink Industries, Belgium
CEFS – Comité Européen des Fabricants de Sucre, Belgium
Coca-Cola European Union Group
COPA-COGECA, Belgium
Danish Agricultural Council, Denmark
Danish Centre for Advanced Food Studies, Denmark
Danish Food and Drink Federation, Denmark
Danish Institute for Fisheries Research, Denmark
Danone
DTU – Technical University of Denmark, BioCentrum, Denmark
Dutch Federation for Nutrition, Food Science and Technology, The Netherlands
EAN International
ECAI
EDA – European Dairy Association, Belgium
ENEA, Italy
EPSO
ERA net SAFETY (SAFEFOODERA)
ESBUC, Portugal
ESF
ETP Plants for the Future
EUFIC – European Food Information Council, Belgium
EUROCOMMERCE
EuCheMS – European Association of Molecular and Chemical Sciences
European Commision, DG Enterprise, DG Research
European Meat Network
FEDERALIMENTARE – Italian Food and Drink Industries, Italy
FEI-BE/BLL
FEVIA – Belgian Federation of Food and Drink Industries, Belgium
FFDI – Czech Federation of Food and Drink Industries, Czech Republic
FHFI – Federation of Hungarian Food Industries, Hungary
FIAA and LVA (Food Technology Network), Austria
FIAB – Spanish Federation of Food and Drink Industries, Spain
FIPA – Federaçao das Industrias Protuguesas Agro-Alimentares, Portugal
Flanders Food, Belgium
FLEISHMAN-HILLARD, Belgium
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Food Standards Agency, UK
Food Testing Institute & Food Research Institute (LVA), Austria
FPME – European Food Processing Machinery Ind. Association
FRESHFEL EUROPE – European Fresh Produce Association
GIQS, Germany
IBA – Institute of Food Bioresources, Romania
Ille Café, France
ILSI Europe, Belgium
Initiativkreis Agrar- und Ernährungsforschung, Germany
INRA, France
INRAN, Italy
Institute of Food Bioresources, Romania
IFR – Institute of Food Research, UK
Justus-Liebig-Universität Giessen – Institute of Nutritional Sciences, Germany
KEKI, Hungary
Kraft Foods
Leeds University – Department of Food Science, UK
National Institute for Research on Food and Nutrition, Italy
Nestlé
ORAFTI, Belgium
OFE, Hungary
Pfeifer & Langen, Germany
Polish National Committee of FIL/IDF, Poland
Polish Technology Platform Food, Poland
Progetto Europa Regions, Italy
Rabo Bank
Research Institute of Brewing and Malting, Czech Republic
RIKILT – Institute for Food Safety, The Netherlands
Royal AHOLD
Royal Society of Chemistry, UK
SAFE Consortium
SEAFOODplus (Integrated Project EC)
SETBIR, Turkey
SEVT – Federation of Hellenic Food Industries, Greece
SIK – The Swedish Institute for Food and Biotechnology, Sweden
SQTS – Swiss Quality Testing Services, Switzerland
SNF – Swedish Nutrition Foundation, Sweden
Swammerdam Institute for Life Science, The Netherlands
TATE & LYLE PLC, UK
Teagasc, The National Food Centre, Ireland
Technology Centre of Science Academy, Czech Republic
TNO Quality of Life, The Netherlands
TTZ, Germany
TUBITAK Marmara Research Center Food Institute, Turkey
UEAPME
Unilever, The Netherlands
University Gent, Belgium
University Maastricht, The Netherlands
University of Bonn, Germany
University of Warmia and Mazury, Poland
VÚZE – Research Institute of Agricultural Economy, Czech Republic
WCFS – Wageningen Centre for Food Sciences, The Netherlands
WUR – Wageningen University and Research Centre, The Netherlands.

Notes

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