THE FIFTH FRAMEWORK PROGRAMME 1998-2002

QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES

WORKPROGRAMME

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INTRODUCTION

The Quality of Life and Management of Living Resources programme is built around six specific Key Actions targeted at enhancing the quality of life of European citizens and improving the competitiveness of European industry. The Key Actions are mission oriented and have a number of clear objectives and measurable deliverables. They focus on the immediate socio-economic and market needs of improving the quality and safety of food, controlling disease, harnessing the power of the biological cell, the sustainable development of agriculture and fisheries, and a healthy and independent old age.

A unique characteristic of the Key Actions is an ability to address the common needs of cross-linked Community policy objectives such as those in agriculture and fisheries, industry, environment, and health.

The capacity of Key Actions to meet emerging socio-economic challenges will depend in part on the extent to which, from the start of the programme, the potential synergies between different projects can be recognised and promoted. In order to ensure this, proposals will be invited from appropriate disciplines in the social sciences to catalyse the links between the life sciences and society.

In addition to the six Key Actions, the programme will support generic activities with the aim of building up the knowledge base in identified areas of strategic importance for the future. These areas include research in relation to genomes, the science of the brain, public health, chronic diseases, and socio-economic and ethical issues surrounding biosciences.

Supporting the Key Actions and Generic Activities, and intrinsic to the programme, are activities such as support for infrastructures, dissemination and exploitation of results, and training opportunities. Entrepreneurship and participation of small and medium enterprises will be encouraged.

KEY ACTIONS

KEY ACTION 1: FOOD, NUTRITION AND HEALTH

OBJECTIVES AND DELIVERABLES

The contribution of improved nutrition to the prevention of diet mediated illnesses will lead to significant social and health care benefits, both at the level of the individual citizen and of defined population sub-groups.

However, a lack of scientific consensus, a lack of understanding in how to communicate dietary messages effectively and a changing regulatory environment are hindering the innovation of products that can contribute to consumer health, well-being and enhanced industrial competitiveness. In addition, potential undesirable components arising in the food chain pose a continuously evolving challenge to the safety of the food chain.

Food SMEs play an important role in producing the great diversity of foods in Europe and the retail sector increasingly contributes to strengthen the links between production, processing and the consumer.

This key action aims to provide a better understanding of consumer requirements, to provide a healthy, safe and high quality food supply leading to reinforced consumer confidence in the safety and wholesomeness of the food supply. A multidisciplinary research effort bringing together a wide range of expertise will be essential to address the following objectives:

- **Addressing consumer needs and enhancing the competitiveness of the European food industry:** The objective is to develop strategies to better interpret consumer demands, attitudes and perceptions, to communicate issues surrounding food risk to consumers more effectively and to improve the quality of food products; thereby strengthening the innovative potential, competitiveness and the creation of employment within the European industry.

  Anticipated deliverables: novel methods of understanding and assessing consumer trust and risk perception; new concepts for effective communication with the consumer; creation of transparent consensus platforms; new predictive models of consumer choice which facilitate innovation of products; the establishment of the scientific basis for the development of nutritionally improved products; optimised raw materials/processing combinations offering added value, safety and improved nutritional characteristics.

- **Assuring the safety and integrity of the food supply:** The objective is to assure food safety by anticipating risks, tracing the sources of contaminants throughout the complete food chain and quantifying risk factors.

  Anticipated deliverables: optimised methods for detecting undesirable components and for enabling the traceability of materials throughout the food chain; new quantitative methodologies to assess risk.

- **Understanding the role of nutrition in health and well being:** The objective is to improve understanding and awareness of the role of nutrition, diet and lifestyle in promoting and sustaining health and preventing disease, to support consumer choices for healthy and wholesome foods and to facilitate the development and understanding of health promoting products and diets.

  Anticipated deliverables: new methodologies to determine the relation between nutrition and health, including pan-European databases of food composition and consumption, biomarkers of exposure and effect; a better understanding of the mechanisms underlying the relationship between food components, food habits and optimal health; foods with improved nutritional value; new genetically engineered foods that have real health benefits for the consumer.

PRIORITIES FOR THE 2000 CALLS

1.1 Development of safe and flexible and new and/or improved manufacturing processes and technologies

1.1.1. Novel and improved biological raw materials for high quality food. The research will focus on the development of food raw materials better adapted to processing and consumer requirements, including plants and animals to provide edible, effective and nutritionally beneficial components and the use of micro-organisms for the production of foods and food ingredients with new characteristics.

Yield and quality improvements along the production chain contributing to higher added value for fish catches, including by-catch and under utilised species; safe use of by-products and waste from fisheries, aquaculture and agro-industry.

1.1.2. Advanced and optimised food technologies, packaging systems and process control. Development of safe, efficient and sustainable processing and packaging technologies (e.g. minimal processing), to optimise the nutritional and sensory quality of foods. Re-evaluation and subsequent optimisation of conventional and traditional processes for maximising quality and safety and reducing food losses. Study of the kinetics of changes of food quality indicators as affected by processing and packaging conditions. Foods with improved properties, e.g. texture, through better understanding of food structure engineering**.** Design of robust sensors for on-line measurements and development of new strategies, technologies and programming environments for process control and automation**.**

1.1.3. Quality monitoring and traceability throughout the food chain. Development of more effective methods to translate consumer criteria of food quality into well defined, measurable parameters, including sensors for measuring these parameters. Development and standardisation of methods and information systems to enable and assure quality management and traceability (e.g. molecular markers, fingerprinting; GMOs, derivatives and ingredients) throughout the food chain and food networks. New concepts of vertical cooperation in the food chain which can assure the consumer of product safety, traceability and production method. The food chain in this key action covers aspects of quality and safety of the raw materials insofar as they affect the final processed product quality.

1.2. Development of tests to detect and processes to eliminate infectious and toxic agents throughout the food chain

Emphasis should be put on foodborne infections and hazards.

1.2.1. Improved understanding and control of contamination conditions arising along the entire food chain from primary producer to consumer. Epidemiological studies on the relationships between food consumption data and the occurrence of adverse health effects including international comparisons. Methods**,** reporting procedures and databases of foodborne diseases. Study of emerging pathogens, viruses and non-conventional agents but excluding mycotoxins. Microbial ecology of food borne pathogens. Transfer mechanisms of antibiotic resistance between animal, microbial and human reservoirs via food ingestion. Determination of the infectivity levels of non-conventional agents in animal tissues and in derived products entering the food chain.

1.2.2. Rapid detection tests particularly for pathogens and hormones. Appropriate methods for rapid and/or cost-effective detection along the food chain of known and emerging pathogens and undesirable chemical substances (e.g. prohibited substances, antibiotics, contaminants), including detection of low-level or sporadic incidence. Pre- and co-normative research, optimisation of sampling protocols and multi-residue testing methods.

1.2.3. New and safer methods of food production and distribution. New food preservation techniques and optimal combinations of processing methods for destroying or inactivating microorganisms and reducing the content of unwanted substances. Processes for inactivating non-conventional agents. Improved equipment design and cleanability, Hazard Analysis Critical Control Point related methodologies, including the use of novel predictive microbial models and traceability methods. Assessment of the safety of convenience foods and catering systems with respect to changing lifestyles of the population.

1.2.4. New methodologies for assessing microbial, chemical and allergenic risks and exposures. New methods for assessing risks from food borne hazards, including improved in-vitro and animal models of human response to exposures, extrapolation techniques from animal studies to humans, advanced modelling and evaluation of inter-species and intra-species variability. Assessment of the effect of long term exposure to low-doses of known hazards. Methodologies to improve accuracy of exposure determinations and of markers for assessing the hazard, exposure and effects of active compounds in the food matrix. Consolidation of existing food consumption databases into a sustainable pan-European database on reliable estimates of intake of contaminants and nutrients**.**

1.3. Research into the role of food in promoting and sustaining health with respect to diet and nutrition, toxicology, epidemiology, environmental interaction, consumer choice and public health

Emphasis should be given to consumer issues and to major public health problems.

1.3.1. Consumer needs, attitudes and responses with regard to food products, food processing and labelling. Methods to analyse long-term consumer needs and decision-making processes and to improve consumer acceptance and preference for foods that contribute to healthy diets as influenced by cultural, educational and socio-economic background. Investigation into effective communication strategies to raise consumer ability to understand nutritional information and to assess food–related risks. Development of criteria for establishing substantial equivalence of novel foods. Identification and analysis of factors that determine trust in the food supply and risk-benefit trade-offs in consumer decision-making. Effects of different modes of regulating and organising the food chain on consumer perceptions and purchase decisions. Better understanding of physiological, psychological and socio-cognitive factors, including the role of sensory attributes, leading to liking, sustained consumption and preferences of food products. Better understanding of how purchasing decisions are influenced with respect to, e.g. products from organic farming, supplements, functional foods and GMOs.

1.3.2. Role and impact of food on physiological functions, physical and mental performance. New methodologies for studying the bioavailability of nutrients and non-nutrients from food matrices in humans, including the influence of factors such as genome, age and food processing. Markers and indicators of dietary exposure, physiological effects and nutritional and health status for defining the normal range of physiological response and the effects of dietary factors and novel ingredients. Study of the impact of diet on behavioural patterns, appetite, satiety, cognitive development and emotional performance. Study of mucosal absorption and microbial metabolism of bioactive molecules as a function of age, health status and food intake. Investigation of gut microflora species, their ecology, including interaction with the host and food components, as well as changes with place in the gut and host age, including the development of quantitative analytical methods and cell models.

1.3.3. Particular nutritional needs of defined population groups. Improved methodologies for collecting, organising and validating food composition and consumption data in relation to health and well-being including factors such as genome, age, cultural origins and lifestyle. Identification of the beneficial effects of foods containing physiologically active components for defined target functions, e.g. functional foods. Development of foods with particular benefits in specific population groups such as babies, children, women at various life-stages and older persons.

1.3.4. Links between diet and chronic diseases and disorders including the genetic factors involved. Investigation of the role of diet and dietary components in the mechanisms of development or prevention of chronic diseases and disorders through epidemiological, clinical, cellular and molecular studies, while taking into account other environmental and lifestyle factors. Determination of intermediate end-points and development of new methodologies for intervention studies. Study of the role of nutritional factors in growth, development and differentiation at the cell and tissue levels. Study of the genetic variability with respect to dietary response and particular diseases and disorders, including the development of specific biomarkers, and identification of risk factors at the level of the individual, taking account of, where appropriate, recent advances in human functional genomics. Influence of foetal and early life nutrition on the pathophysiology of disease.

KEY ACTION 2: CONTROL OF INFECTIOUS DISEASES

OBJECTIVES AND DELIVERABLES

About one third of all deaths occurring globally are due to infectious diseases. Whereas mortality is highest in developing countries, morbidity is considerable in the industrialised world, where direct and indirect costs from disease are very high. Population migration, massive travelling and climatic changes are favouring the rapid spread of pathogens. Given the growing burden of infection in a global environment for trade and travel, Europe and its citizens remain vulnerable. Furthermore, drug resistance is an ever growing health threat. Regarding animal infectious diseases, in addition to the increasing risk to human health represented by zoonotic diseases, outbreaks of infectious diseases in animals for livestock production and aquacultural industry impose heavy costs to the economy.

The main objectives of this key action are: (i) to improve the prevention and treatment of infectious diseases of major public health importance through the development of new and improved preventive and/or therapeutic vaccines and vaccination strategies, (ii) to identify and exploit new targets for anti-infective interventions, (iii) to develop new diagnostic tests, (iv) to develop tools for epidemiological monitoring and forecasting, and (v) to develop the research base for rational public health practices related to infectious diseases.

Important synergies are expected from the integration of human and animal health research, breaking with past traditions of these research sectors. In addition, regarding infectious diseases in animals for livestock production and aquacultured species, research will provide the scientific and technical basis in support of Community rules and policies.

For the purpose of this key action, "animals" is defined as animals for livestock production and commercial aquatic animals, unless otherwise specified.

A principal deliverable of this key action will be integrated Community-wide approaches for the development of control tools against major human and animal infectious diseases, mobilising relevant stakeholders towards that end. More specific deliverables include:

- **Vaccine development**

  Anticipated deliverables: identification of rational targets and delivery mechanisms for, and evaluation of candidate vaccines; identification of mechanisms of immune protection, indicators of protection and pathogenicity; development of validated animal model systems; creation of multi-centre pre-clinical and clinical trial networks for vaccines.

- **Strategies for treatment and prevention**

  Anticipated deliverables: new targets for anti-infective intervention and strategies for novel immune interventions; strategies for the optimal use of anti-infective agents; standardised and validated criteria for resistance monitoring; improved understanding of the biological and epidemiological basis for controlling antimicrobial resistance; new diagnostic test systems.

- **Public health**

  Anticipated deliverables: new risk assessment methods; the research base for an epidemiological surveillance and control network; improved surveillance systems for specific diseases; methods for assessing medicinal product safety and adverse reactions; improved evidence-based public health practices; new evaluation methodologies.

PRIORITIES FOR THE 2000 CALLS

2.1. Development of improved or novel mono-component, multi-component and combined vaccines

Support will be given to the development of vaccines against human and animal infectious diseases, including cancer and other chronic conditions triggered by infectious agents, and zoonoses. The development of vaccines and vaccination strategies both for preventive and/or therapeutic purposes will be considered. Human diseases should be of considerable public health importance, as defined by global morbidity and mortality, or have a well-documented risk of becoming an important health threat. For animal diseases, research should be relevant to the improvement of the human food chain, animal welfare, economy of production, environmental biosafety and should be relevant to EU common policies in relation to livestock production and aquacultured species. The development of vaccines for humans and animals is also understood as an important strategy to reduce the use of antimicrobials. Safety aspects of vaccines and vaccination will be considered.

To reach these objectives, this key action aims at accelerating the process of research and development of vaccines. It covers the range from underpinning strategic research up to early clinical evaluation of vaccine candidates. Critical gaps in fundamental knowledge should be targeted, as well as development opportunities explored. Whenever possible, projects should take stock of synergies from the integration of human and animal health research, and optimising input from underpinning disciplines, such as genome research and structural biology.

The priorities are:

2.1.1. New vaccination strategies. Study of immune responses, in particular to non-protein antigens, and research on innate immunity. New adjuvant, antigen delivery and formulation concepts for

systemic and mucosal induction and targeted modulation of immune responses. Simplified vaccination strategies, including underpinning research for combination vaccines and marker vaccines. Immunisation strategies for special target groups, including neonates and the elderly. Vaccination strategies for wildlife animals.

2.1.2. Discovery phase and pre-clinical development of preventive and therapeutic vaccines. Identification and exploitation of new targets for vaccination through a better definition of pathogen properties, pathogen-host interactions and pathogenesis, understanding of environmental and genetic factors. Identification and measurement of protective immune responses and correlates of protection, assessment of immunopathology and adverse reactions. Development of relevant animal model systems.

2.1.3. Clinical evaluation of vaccines. Early clinical testing of vaccine candidates (phase I and II) through demonstration projects, provided there is due justification for public sector support. Clinical trial networks (phase III-IV) through concerted actions and thematic networks. Networks focussing on clinical trial methodologies and on clinical trial sites.

2.2. Strategies to identify and control infectious diseases

This area will provide support to the development and exploitation of new concepts for treatment strategies and, as stated in the Council Resolution of 8 June 1999 on antibiotic resistance (1999/C 195/01), to support integrated approaches to control antimicrobial drug resistance. Support will also be given to the development of new diagnostic tools for infectious diseases in humans and in animals.

The priorities are:

2.2.1. Treatment of, and protection against, human and animal infectious diseases. Discovery of novel compounds and techniques directed at new molecular targets, in particular for under-explored stages in microbial life cycles and for host-pathogen/vector-pathogen interactions. Exploitation of the potential of gene- and immuno-therapy. Identification of new classes of antimicrobials. Development of alternatives to antimicrobials, including probiotics and competitive exclusion.

2.2.2. Antimicrobial drug resistance and changes in virulence. Understanding the mechanism and evolution of antimicrobial resistance and transmissibility of resistance in and between human and animal populations. Identification of clinical correlates of resistance. Standardisation of resistance monitoring and development of evidence for the appropriate clinical use of antimicrobials.

2.2.3. Diagnostic tests for humans and animals. Development of diagnostic tests for early stages of disease. Identification of markers of disease progression and cure. Methodologies for strain typing and differentiation. Development of integrated tests for field use, standardisation and validation of diagnostic tests, development of high-throughput assays and multiple diagnosis systems. Development of new rapid diagnostic and susceptibility tests for focused antimicrobial treatment.

2.3. Aspects of public health and care delivery systems

Support will be given to the development of improved systems for risk assessment, transmission and surveillance of infectious diseases in (and between) humans and animals as well as to the development of new methods for medicinal product safety regarding infectious agents. Support will also be given to organisational and economic aspects of public health related to infectious diseases.

The priorities are:

2.3.1. Risk assessment, transmission and surveillance. The development of methodologies to investigate changing patterns of diseases, including outbreaks and risks due to e.g. environmental changes, transport, migration and travel. Assessment of the infectious risk associated with xeno-transplantation. Development of epidemiological knowledge of the role of infectious agents in major diseases. Methodologies for set-up and evaluation of local, national and Community-wide surveillance systems and early detection of communicable diseases in humans and animals, particularly novel pathogens, microbial resistance, nosocomial infections and vaccination coverage. Research in support of the network for the epidemiological surveillance and control of communicable diseases in the Community (decision N° 2119/98/EC of the European Parliament and the Council).

2.3.2. Methodologies for medicinal product safety surveillance in the market place. Development and evaluation of: (i) methodologies for risk assessment and quality control against the contamination by infectious agents of medicinal products, blood and blood products; (ii) and methodologies for pharmaco-vigilance of adverse reactions, including allergies to vaccine components.

2.3.3. Organisational and economic aspects of human and animal health. Comparative assessment of the efficacy and effectiveness of different interventions for infectious disease control, including vaccination programmes. Studies on the determinants of public acceptance of community intervention against infectious diseases. Understanding of socio-economic factors and the role of human behaviour in relation to disease prevention, transmission and control.

KEY ACTION 3: THE "CELL FACTORY"

OBJECTIVES AND DELIVERABLES

The integration of innovative research and technologies with their exploitation by industry and/or other socio-economic entities in the fields of health, environment, agro-industry, agri-food and high value added chemicals is the aim of this key action. Particular attention will be given to the problem solving approach of strengthening European industrial competitiveness by improving the potential for creation of small research-based biotechnology firms and entrepreneurial initiatives. These knowledge-based new industries are a reservoir of industrial competitiveness, scientific and technological innovation, opportunities for investors, and jobs creation, which is still underexploited in Europe.

An environment in which scientific results could be rapidly exploited and transformed into products and processes of interest to society will be provided, through integrating the whole process of innovation, from advanced research, through technological development up to demonstration. Such an integrated innovation approach is an absolute pre-requisite in this key action, but the exploitation phase may also be a non-industrial one, depending on the particular socio-economic environment associated with a given scientific and technological area, e.g. biosafety research to be used by public-interest organisations, *in-vitro* alternative testing to replace animal experimentation, research results to be used by clinicians and in hospitals.

This key action will therefore mobilise the necessary operators (e.g. scientists, industrialists, venture capitalists, "biovalleys" and "bioincubators" for nurturing start-ups, consumer and patient's associations, public-interest groups) to address the following objectives in a co-ordinated and convergent way, linking the ability to discover and the ability to exploit:

- **Innovative technologies mobilising mission oriented research.** New knowledge will be generated on the functioning of cells, including GMOs, as biological factories, by advanced research such as genomics, proteomics, patterns of metabolites, combinatorial biochemistry, high-throughput screening, nanobiotechnology, structural biology, molecular evolution, bioinformatics, genetic and biochemical engineering. These multidisciplinary technologies applicable to many fields of the cell factories will provide new processes and molecules, for implementing the priorities given in the workprogramme.
- **Exploitation of RTD results**. Scientific and technological excellence is necessary but not sufficient. It must be closely linked to a firm commitment to knowledge transfer and to convincing exploitation by industry and/or public interest organisations. Efficient risk capital markets, creation and development of high-tech SMEs, and promoting the dialogue of technology producers with technology users are crucial for linking research to socio-economic needs, leading to future wealth and job creation. The challenge is therefore to set up a nurturing environment both for the development of established bio-industries and for a new generation of European entrepreneurs to start up and flourish.

Towards the anticipated deliverables: improving the competitiveness of established bio-industries and triggering the creation and sustaining the growth rate of new biotech research-based industries, European players should be mobilised to seize opportunities in the following 3 priority areas:

- Improving the diagnostic and therapeutic arsenal for health care**.**

  Anticipated deliverables: New and improved health related processes and products from living cells and biomolecules, in particular towards diagnostics tests, innovative technologies for biological production, novel targets for drug discovery, novel and improved therapeutics for health care (such as new antibiotics, anticancer therapies...) and development of in-vitro tests as alternatives to animal experimentation.

- Improving environmental sustainability.

  Anticipated deliverables: More efficient and cleaner technologies for industry, exploitation of industrial by-products and improved methods of treating waste-water. Bioassays for pollution

monitoring. Techniques for biodegradation of pollutants and bioremediation. Improved tools for exploiting biodiversity. Methods and strategies for safe introduction, use, monitoring and tracing of GMOs. Contribution to policy development in this area.

- New biological and biotechnological products and processes for agro-industry, agri-food and high value added chemicals

  Anticipated deliverables: Bio-processes and products offering ecological, industrial and consumer advantages, high value-added products and processes for agro-industry and (bio)chemical sectors, biocatalysts, nanobiotechnology devices, and products derived from improved organisms, including GMOs.

PRIORITIES FOR THE 2000 CALLS

Projects must combine excellent science and convincing exploitation strategies

According to the objectives and problem solving approach of this key action, all projects to be supported must mobilise scientific excellence, innovative technologies and convincing exploitation strategies by bio-industries, entrepreneurial initiatives, hospitals and/or public-interest groups as appropriate, and taking into account the socio-economic context, including the intellectual property rights. The projects must fulfil this absolute pre-requisite. Depending on their goals, the applicants are also invited to consider either the specific mission-oriented approaches of other key actions or the building up of a new knowledge base in the generic activities. Provided the projects do satisfy the above pre-requisite, they may address a wide spectrum of targets. Consequently, and in order to leave room for innovative ideas from applicants, each of the following RTD priorities only give "aspects for consideration" which are non-exhaustive examples.

3.1. Improving the diagnostic and therapeutic arsenal for health care

3.1.1. Development of new diagnostics

Aspects for consideration: new diagnostic tests and procedures aimed at detecting early markers and weak signals in pathology, including near-patient diagnostic tests, tests to ensure the safety of biological fluids, nucleic acid diagnostic tests, and *in-vivo* imaging. Quality control and safety aspects of diagnostic tests will also be addressed.

3.1.2. Therapeutic substances

Aspects for consideration: design and development of new therapeutic substances such as antibodies, antimicrobials, anticancer, and other bio-active compounds to be used in therapy. Improved, safe and efficient production of therapeutic substances, including vaccines, by micro-organisms, plants or animals. Innovative screening of new therapeutic substances, including those based on analysis of complex genetic and physiological data.

3.1.3. Therapeutic strategies

Aspects for consideration: Development of nucleic acid and cell therapies, cell and tissue engineering and target specific delivery systems. Development of cell lines for cell mediated gene therapy and of biological substitutes that restore, maintain or improve tissue and organ functions.

3.1.4. Novel *in-vitro* testing as alternatives to animal testing

Aspects for consideration: reinforcement of pre-normative research by making cell cultures available as a substitute for animal testing, development of high throughput screening for detecting toxicity, and *in-vitro* toxicity tests, e.g. local toxicity, immuno-toxicity, neuro-toxicology.

3.2. Improving environmental sustainability

3.2.1 New bioprocesses for industrial efficiency, to avoid pollution, make use of bioaccumulable wastes and by-products, and treat waste water

Aspects for consideration: increase efficiency in energy and raw material use or prevent pollution at source through enzyme or industrial process technologies employing modern biotechnology, for example, by developing novel biocatalysts or designing micro-organisms to carry out specific tasks; modern biological methods to treat waste water for re-use; develop methodologies for assessing "cleanliness" of biotechnological processes and products.

3.2.2 Bioassays and biosensors

Aspects for consideration: bioassays and biosensors for fast and efficient warning of pollution incidents, to assay pollution levels and monitor *in situ* remediation, and for detection of GMOs and their products along the production chain.

3.2.3 Biodegradation of recalcitrant chemicals and bioremediation

Aspects for consideration: Development of systems to improve bioavailability (e.g. dynamics of micro-organisms in the soil); improve efficiency of biodegradation processes (e.g. biochemistry of anaerobic processes, phytoremediation); exploit biodiversity of biodegradation (e.g. regulation of catabolic pathways); biostabilization of contaminated sites presenting ecological risk; bioaccumulation of pollutants.

3.2.4 Biodiversity and ecological dynamics of natural and introduced populations

Aspects for consideration:

- Micro-organisms. Develop methodologies and undertake research to explore microbial biodiversity and exploit micro-organisms in the environment; assess population structure and dynamics, microbial interactions and diversity through development of markers, monitoring and identification strategies; assess environmental impact of novel uses of biodiversity such as soil fertility-enhancing or biocontrol micro-organisms or biopesticides.

- Plants and animals. Development and use of molecular tools for investigating genetic diversity, population structure and population dynamics in agricultural and natural systems. Assessment of gene flow dynamics in agricultural and associated semi-natural or natural habitats, and of possible ecological impact of using transgenic plants and animals; development of exploitation systems to reduce any such impact.

3.2.5 Methods and strategies for safe use of new biomolecules and bioprocesses, for identifying recombinant organisms and their residues in the environment and assessing their impact on human and animal health, to support Community policies

Aspects for consideration: Development of accurate, reliable, fast and sensitive methods to provide quantitative detection and identification of specific organisms, particularly GMOs, and their products throughout production and consumption chains and in the environment. Methodologies for assessing and monitoring the presence and effects of GMO and recombinant products used to improve human and animal health, and for their contribution to improving standards in environmental care. Research contributing to the development of criteria and standards for assessing environmental safety of GMO use.

3.3. New biological and biotechnological products and processes for agro-industry, agri-food and high value added chemicals

3.3.1. Exploiting the cellular and molecular characteristics of organisms.

Aspects for consideration: nanobiotechnology covering both the application of new scientific tools to biological systems, the use of biological systems as tools in the development of new products and technologies. Studies will be at the level of molecules (e.g. biomolecules self assembly), the coupling of molecules and cells to natural and synthetic surfaces (e.g. control of interactions between proteins and cells and surfaces) and the functional structures (e.g. material processing technologies for nanofabrication).

3.3.2. High value-added products and processes involving / derived from micro-organisms, plants and animals

Aspects for consideration: Improving the expression of genes for stable and reliable use. Developing more efficient fermentation, bio-transformation, and downstream processing. Using genomic data and reproductive mechanisms. Engineering of the pathways of primary and secondary metabolites of economic importance including the cellular and organ optimisation of compounds. Identifying and developing mechanisms towards resistance against physical and biological stress factors.

3.3.3. Functional biomolecules and biocatalysts.

Aspects for consideration: development of highly efficient biomolecules of utmost specificity as well as wide variety and programmable properties, through mobilising structural biology, structural genomics and directed molecular evolution.

3.3.4. Identification and sustainable use of metabolic and genetic diversity as a source of new valuable products.

Aspects for consideration: New or improved methods for screening of marine and terrestrial organisms. Molecular characterisation of wild and domesticated populations, including unculturable micro-organisms, to identify useful products and genes for recombinant production systems. Genetic improvement of wild or under-utilised organisms to introduce them for cultivation or adaptation to new environments.

KEY ACTION 4: ENVIRONMENT AND HEALTH

OBJECTIVES AND DELIVERABLES

The EU is confronted with a substantial increase in environmentally related health issues such as the rising incidence of allergies, respiratory diseases and cancers. There are claims that these issues are related to new, modified and combined exposures to environmental factors. The challenge is to strengthen the scientific evidence by which such claims can be assessed to support informed decision-making by public authorities, industry and individual citizens. Success in reducing environmental health effects needs refined and more effective methods for diagnosis and risk assessment, as well as innovation in the risk management processes. Furthermore, the lack of adequate exposure data and of knowledge on dose-response relationships inhibits the possibilities for better and effective prevention and treatment.

This key action will create and exploit data and research synergies between relevant disciplines and methodologies in the social, medical, technological, occupational, public health and environmental domains with a view to assessing, limiting and controlling exposure to chemical, biological and physical environmental hazards, including occupational settings. This networking at a European level will contribute towards providing the evidence base for the development of adequate environmental and health policy measures.

Objectives and deliverables

Reduction of health effects (including allergies) as related to environmental factors: the objective is to decrease the negative health impacts (as reflected on morbidity and mortality) of environmental factors, in particular noise*;* indoor and outdoor air pollution; heavy metals; toxic substances; electromagnetic radiation[1] (including ultraviolet radiation) and to gain insights into prevention from a combined environmental and health point of view.

Anticipated deliverables: include pan-European databases for relevant exposures and health outcomes; improvement of quality, relevance and inter-comparability of both environmental monitoring data and health data; identification of new prevention strategies.

- **Assessment and reduction of environmental health hazards:** the objective is to improve scientific and public knowledge on the links between exposure, health outcome and risk, and the interrelationships with other health risks, taking advantage of the cross-border environmental diversity of the EU. As such it will be possible to better understand, assess and control risks to the population from environmental factors.

  Anticipated deliverables: include standardised methods for assessing exposure and effect; identification of dose-response relationships between specific environmental exposures and health outcomes; quantification of the relative contribution of routes of exposure (inhalation, food and skin) for relevant environmental exposures; input to European information systems; improved risk assessment methodologies.

- **Support to health and environmental policy-making and public information:** to strengthen the scientific basis for public sector and industrial decision-making in relation to the environmental health effects. This will allow priority setting in environmental and health policy and will support regulatory bodies in their efforts. To strengthen the knowledge base on which the public may make informed decisions in relation to actual and perceived risks.

[1] *See also comment in paragraph 2 of "PRIORITIES FOR THE 2000 CALLS" concerning EMF radiation and cellular phones.*

Anticipated deliverables: include support to decision-making in environmental and health policies; improved information on links between environment and health; improved understanding of the socio-economic impact of environmental health effects.

Priorities for the 2000 calls

The priorities for 2000 are grouped under two perspectives. The focus on section 4.1 is on increasing the understanding of the pathways that link exposure to health effect. Section 4.2 aims to provide industry and policy-makers with improved tools to assess and manage risk.

Resulting from the satisfactory coverage of research on the possible health effects linked to EMF radiation and cellular phones through R&D projects in the 1999 call, only concerted actions, thematic networks and accompanying measures are invited for submission in this field in the call of the year 2000.

4.1. Diseases and allergies related to or influenced by the environment, their prevention and treatment

4.1.1 Analysis and quantification of the impact of environmental factors on human health.

Aspects for consideration: identification and quantification of the environmental (ambient and occupational) factors predisposing individuals to development of environment related health effects and identification of the special needs of high-risk groups (e.g. occupational groups, children, elderly, susceptible and/or genetically predisposed groups and individuals, socially deprived groups) to improve the potential for reducing the negative effects of the environment on health. Identification and validation of allergens, including new emerging ones, and of their distribution, to better understand how to combat and prevent allergies. Identification of particularly relevant mixtures and combined exposures of environmental factors. Standardisation of incidence and prevalence of environment related diseases taking into account geographical variation, to allow comparison of data and interventions at EU level.

4.1.2 Assessment of the relative importance of, and the interactions between, factors impinging on health.

Aspects for consideration: study of influencing factors and of pathways of exposure to noxious agents and substances to improve knowledge on the mechanisms leading to environment related health effects. Elucidation of relevant pathways of exposure to single and combined noxious environmental agents. Establishment of mechanistic and dose-response data to better link exposures to effects both from laboratory and from epidemiological studies.

4.1.3 Development of an integrated approach to risk management taking into account environmental and public health aspects.

Aspects for consideration: to quantify adverse health effects and their impact on the European population (with emphasis on health endpoints, including cognitive functions) in order to understand the role of environmental conditions on life expectancy, morbidity and mortality and to facilitate more appropriate public health strategies. To improve quality, relevance and inter-comparability of environmental data and health data, including longitudinal data, to be used to monitor and compare environment and health effects. Studies for the assessment of the economic and social effects and costs of environmental hazards leading to better priority setting in public health. Improved techniques to address the issues of risk perception and communication to arrive at adequate information towards the public.

4.2. Development of new methods of diagnosis, risk assessment and processes to reduce causes and harmful environmental health effects

4.2.1 Development of methods to assess environmental hazards including mixed exposures, cumulative and low dose effects.

Aspects for consideration: innovative methodologies to investigate and compare the health effects of mixtures of pollutants, toxic substances including solvents and heavy metals as well as combined and low dose effects of agents and electromagnetic radiation[2]. Epidemiological and biomedical studies to

[2] *See also comment in paragraph 2 of "PRIORITIES FOR THE 2000 CALLS" concerning EMF radiation and cellular phones.*

determine possible effects (including cognitive effects) and dose–response relationships for noise (e.g. in the domestic environment, from transport sources, in occupational settings, etc) and non-ionising radiation[3]. Methods, including mathematical and other types of models, for measuring the relative importance of different factors, routes and rates of exposure to complex environmental mixtures of pollutants.

4.2.2 Improvement of predictive toxicity testing and mechanism-based risk assessment consistent with the aim of the reduction and eventual replacement of animal testing.

Aspects for consideration: to improve the toxicological methods, with emphasis on *in-vitro* test systems, and alternative screening and testing protocols to arrive at better diagnosis of health effects and risk assessment of environmental substances or agents harmful to human health. Investigations in intra-species and inter-species variability in order to limit uncertainties and to establish more reliable data sets and to improve the scientific basis for extrapolation from e.g. animal and cell culture data to humans. Development of new screening and testing protocols (e.g. mutagenesis and carcinogenesis) taking into account existing international chemical and regulatory testing programmes and protocols with emphasis on the need to integrate endpoints.

4.2.3 Improved methods and technologies for long and short-term exposure and effects assessment including biomarkers (and bio-indicators) of environmental exposure, and susceptibility to environmental agents.

Aspects for consideration: identification and validation of the interaction of genetic and environmental risk factors and development of bio-markers allowing to identify exposure, susceptibility and vulnerability to exposure, and to identify early reversible effects. Development and application of methodologies and technologies to arrive at better assessment and risk characterisation of short and long term exposures, and of low level exposures including cases where it is not feasible to establish thresholds.

KEY ACTION 5: Sustainable agriculture, fisheries and forestry, and integrated development of rural areas including mountain areas.

OBJECTIVES AND DELIVERABLES

The aim is to improve the quality of life through the sustainable production and rational utilisation of natural resources with a special emphasis on new technologies, including biotechnology. Applicants should address how European socio-economic and environmental objectives with respect to the sustainability of natural resources can be best met through the relevant scientific and technological advances. A multidisciplinary, integrated approach is desirable, encouraging the active participation of farmers, end-users, consumers and regulatory bodies, with special attention given to the targeted dissemination and utilisation of the results. Research efforts should aim to address the following objectives*:*

- **Competitiveness with its direct implications for (i) employment and conditions in rural and other relevant areas; (ii) reduction of the vulnerability of the relevant sectors through diversification; (iii) the response to societal demands for sound environmental practices and(iv) the sustainable production of renewable resources**. Research will contribute to support the implementation of the evolving Common Agricultural Policy (CAP) and Common Fisheries Policies (CFP) and their adaptation to the limited availability of natural resources, the evolving societal needs and demands, the evolving world trade situation and globalisation of markets and E.U. enlargement. It will also support the implementation of international commitments and Community measures on the protection and sustainable management of forests and other living resources.

  Anticipated deliverables : (i) objective information in support of farming, fishing and forestry production systems, of integrated rural development, of policy orientations and Community measures; (ii) tools and methods to foster, assess, measure and monitor competitiveness and sustainability of agriculture, fisheries and forestry, improvements of products quality and employment prospective; (iii) tools and methods to anticipate the need for adaptation of policy instruments, to implement and monitor these instruments, to foster integrated rural development; and to reduce negative impacts on the environment or to enhance societal benefits of the

agriculture, fisheries and forestry sectors; (iv) the assessment of the effectiveness of these tools, methods and policy instruments.

- **Sustainable management and utilisation of biological resources.** Research will strengthen the technical and economic competitiveness of bio-based industries through integration of various scientific disciplines encompassing current and future market requirements, processes and production practices. This will allow for a better realisation of the economic, social and environmental benefits arising from the sustainable management and utilisation of biological resources.

  Anticipated deliverables: Research will provide for sustainable production and clean and efficient process technologies which will lead to the delivery of new or improved products with high-value added and lower impact on the environment. It will expand the production and use base of biological raw materials through integrating raw materials production with industrial and market needs.

- **Products and processes complying with consumer well-being and quality requirements.** Research will focus on factors affecting the delivery of high quality products considering all aspects of production and processing, including final product characteristics, safety aspects and market requirements.

  Anticipated deliverables: Research will provide the scientific and technological basis for the development of new or improved products, corresponding to consumer requirements, and delivered with detailed data on life cycle, recyclability, cost analysis, safety and product performance.

PRIORITIES FOR THE 2000 CALLS

5.1. New and sustainable systems of production, including breeding methods and exploitation in agriculture, fisheries and aquaculture, taking into account profitability, the sustainable management of resources, product quality and employment as well as animal health and welfare.

5.1.1. Sustainable agriculture

New and improved production and farming systems

Farming systems :

Research will focus on new and improved farming systems, also covering new crops and horticulture, farm animals and their associated support tools, including genome analysis, encompassing the whole production process and which combine economic competitiveness, optimal use of inputs, consideration of animal welfare in stock farming systems, product safety and quality, protection and enhancement of the environment, landscape and habitats and rational use of soil and water, while considering employment.

- *Conventional farming systems:* Crop and animal production systems giving optimal output of high quality products, while meeting the above mentioned characteristics.
- *Organic farming systems:* Solutions for conversion to such systems and means to overcome existing obstacles; support to identification and control including traceability; market analysis; strategies for higher product value; development of technico-economic references and support to EU legislation.
- *Integrated farming systems:* Production systems giving optimal output of high quality products, using as much as possible natural regulation mechanisms and products with improved genetic material where appropriate, thus reducing levels of chemical inputs.

In the context of the above mentioned agricultural systems, attention will be paid to the comparison of the use of agrochemicals in the cultivation of genetically engineered crops with that of conventional crops; of the non target effects of genetically engineered crops with those of agrochemicals; of the gene transfer from genetically engineered crops or micro-organisms with that of conventional crops. There is also a need to understand more fully the impact of the different farming systems on the environment, as well as the socio-economic implications when compared to conventional systems. Indicators must be developed and/or improved to assess and monitor the progress made in improving farming systems, and the potential negative effects need to be reduced and potential benefits enhanced.

In addition proposals addressing safety and traceability issues concerning animal feed production and contamination, as well as production and contamination at the farm level, are also encouraged.

Sustainable management of resources in agriculture :

Environment-friendly waste management and recycling and sustainable use of off-farm waste; reductions of emissions and pollutants of all kinds; the effect and fate of chemical inputs; the development of technical solutions to avoid unforeseen risks and spread of genes; the measurement of persistence and effects of DNA in the environment (including the soil); the protection of landscape and natural areas in relation to agricultural production.

Protecting and improving the genetic diversity in agriculture requires improved methods of germplasm conservation and analysis along with the establishment of a long term definition of desirable and undesirable traits (taking account of the producers and consumers viewpoint) and a better co-ordination between EU and international levels; market analyses and identification of ways to derive income from genetic diversity conservation.

The sustainable use of soil and water resources will be promoted through the prevention of erosion, salination and groundwater spoilage; agricultural systems adapted to extreme conditions and the development of innovative, and efficient irrigation systems, water re-use and recycling.

Plant health

Research on plant health will focus on support for Community policy objectives. It will target quarantine organisms, organisms which are specially harmful or difficult to control, and those which pose a threat to the free movement of goods and services. New rapid reliable cost-effective, and safe products, tools and methodologies are needed for the detection, control and (where appropriate) eradication of these organisms; for their classification, forecasting (including farm level decision support systems) and risk assessment; for preventing or controlling these organisms and their negative effects, including at the post harvest stage; and for analysing the impact on the environment and the food chain of crop protection methods

Special attention will be paid to the use of biotechnology and other scientific disciplines, for improved health of plants in organic, integrated as well as conventional agriculture. In particular, improved understanding of novel and innate defence mechanisms of plants and ecosystems will be used in plant breeding and biological control. Special emphasis will be placed on the replacement of protection methods, which may have adverse effects on environment and health, particularly those methods which have recently been or which are about to be withdrawn.

Projects must foresee transfer of the results to economically active end-users and therefore examine relevant socio-economic aspects and all complementary multidisciplinary quantitative studies whose results will be needed at the point of use. These results include as well as practical questions of implementation at farm level, knowledge of acceptable (non-zero) levels of the pest or disease, and of the real costs and risks of new and existing control measures.

Health and welfare of animals used in farm livestock production

In addition to the issues addressed in the Key Action “Control of infectious diseases”, RTD will focus on: identification and evaluation of more resistant animals; contaminants and toxins present in feed; harmonised scientific parameters and analytical methods to ensure high quality feed and public health; Hazard Assessment Critical Control Points (HACCP) in the feed production chain; the role of livestock nutrition in determining the quality of meat; the effect of promoters on meat and milk including the implications for public health, animal health and welfare and farming systems; other serious animal health problems such as the impact of endocrine disrupting agents; improved methods for evaluating the impact of veterinary products on public and animal health: development of strategies for reducing antibiotic use in animal husbandry.

To improve animal welfare, a better assessment of welfare requirements is needed, along with the assessment and improvement of animal welfare from housing to slaughter (including transport) and the relationship between animal welfare and product quality. Methodologies for an integrated assessment of existing husbandry systems and the development of new ones will be sought.

Quality policy. Agricultural products and farm-processed products

Focus on the analysis of consumer expectations and behaviour with regard to agricultural products and products processed on the farm, including those using GMO; on the development of appropriate technologies for small scale production of agricultural products processed on the farm; on an overall

support to production branches producing "quality products" as laid down in Community legislation, including the implementation of the "Total quality" concept throughout the production and marketing chain. Methods for measuring and controlling quality and comparing quality and standards of controls in Member States for monitoring and control of the application of Community rules on quality foodstuffs.

5.1.2. Sustainable fisheries and aquaculture

Interactions between environment, fisheries and aquaculture

Research will focus on methods and strategies to assess or reduce, where undesirable, the effects of the interactions between environment, fisheries and aquaculture. It will improve our understanding of the impact of environmental changes (whether induced by humans activities or not) on the dynamics of commercially harvested living resources and on aquaculture, with particular emphasis on the effects of toxic algae. To improve the understanding of the impact of fisheries on the marine ecosystems, it will concentrate on the foodwebs, on the physical impact of fishing gear on the seabed, on the demographic structures of exploited fish stocks and by-catches, and on genetic diversity. Furthermore, it will aim at defining specific targets for the protection of biodiversity. As for aquaculture, it will focus on the effects of farm effluents and on the interactions between wild, farmed and ornamental organisms with special emphasis on genetics, including GMOs, and diseases.

Scientific basis of fisheries management

Research will concentrate on the improvement of management tools and on the relationships and interactions between biological, economic and fleet capacity aspects of resource assessment and management, including data requirements. This includes the improvement of available assessment methods used for formulating scientific advice to management, with particular emphasis on the less known resources, the assessment of risks and uncertainties associated with the models, as well as the development and validation of methods to establish the geographical limits and genetic structure of fish stocks.

Improvement of aquatic production

Priority will be granted to multidisciplinary research efforts encompassing various fields of aquaculture genetics and related areas and the clarification of essential biological functions benefiting aquaculture production, including the corresponding genetic bases and heritability. The development of tools to facilitate the identification of suitable source populations with profitable traits including the application of genome mapping will be promoted, as well as the integration of these tools and populations to selective breeding programmes. Research will investigate the influence of nutrition, environment and husbandry on the health of farmed species. Research will also focus on alternatives to fishmeal and fish oil in fish diets It will also address the technical and economic potential of species diversification and technological innovations such as offshore aquaculture, including their environmental aspects.

5.2. The integrated production and exploitation of biological materials for non-food uses

A long-term goal is to prepare the foundations for the bio-based industries of the future, thereby addressing industrial sustainability and the depletion of fossil resources. The more immediate goal of this key action is thus to develop alternative industrial materials from biological materials which will offer diversified opportunities for farmers, and renewable industrial intermediates and products to the end user and consumer. Market feasibility is a pre-requisite for success along the complete integrated production, processing, utilisation and disposal chain, thus a strong industrial participation, linked where applicable to the potential impact on agriculture is essential for selection. Research and development will focus upon primary production systems (including storage and transport) and the physical, chemical, and biological, transformation and processing of material from plants, animals and microbes (including organic waste material), to produce higher added value, and large volume products. The key issue of economic competitiveness in comparison with products derived from fossil resources has to be addressed. Industrial product sectors to be targeted include: Biopolymers and additives for packaging and construction (films and fibres); Bulk chemicals such as lubricants, solvents, detergents and surface coatings; Fine chemicals for personal care, flavours, agrochemicals and pharmaceuticals; and Biofuels for the energy and transport sectors.

The Raw Materials: Agricultural production systems for biological raw materials matching non-food industrial requirements and demand with respect to quality, security of supply, sustainable land management, the environment, and conservation of biological diversity, should be developed. Projects should aim at optimising yields of valuable molecules and materials through conventional and recombinant genetics. Storage and transport systems which preserve and increase the recovery of valuable components should be developed including near point of production processing technologies, which add value, reduce costs, and improve whole crop utilisation. Information on the true market and economic prospects for industrial renewable materials must be developed with respect to production and processing costs and identifying market outlets. Ways to integrate non-food crop production with traditional food production systems and to consolidate the industrial need with the agricultural supply and the needs of rural communities will be sought.

The Factory: Product oriented research will focus on the physical, chemical, and biological extraction and modification of oil, protein, starch, sugar and fibre material from plants, animals and wastes to produce bulk or fine chemicals, biopolymers, and biofuels. Improved processing technologies are sought which enhance the recovery of purer products. This includes addressing the problems associated with scale-up processes, the adaptation of conventional processing technologies, and the modification of functional groups, along with the processing of biologically based wastes.

The Market: Biomaterials with enhanced performance supported by life cycle assessment studies will be demonstrated and the results applied in the promotion of recognised standards codes and guidelines for the consumer and end-user. Consideration should be given to scale-up processes, pilot production, and market tests of bioproducts with respect to performance aspects such as permeability, absorption, oxidation, viscosity, temperature stability, safety energy balance etc. Sectoral market studies addressing the key barriers to larger market penetration of renewable bioproducts are welcome.

5.3. Sustainable and multi-purpose utilisation of forest resources; the integrated forestry-wood chain

5.3.1. Multifunctional management of forests

RTD will focus on the following:

- *The support to the pan-European forestry policy processes and socio-economic aspects needs* strategies and options at E.U. level for the implementation of international commitments; instruments for a concerted approach to the sustainable evolution of forestry; evaluation of non-marketed forest goods and services and the contribution of forestry to rural development; public perceptions on the use and management of forests and on their role in the society; strategies such as certification, to enhance the value of forest resources, and services.

- *The sustainable multifunctional management of forests* requires improved criteria and indicators in particular at unit level. Improved understanding of the functioning, diversity and stability of different forest ecosystems and of the interactions between forestry activities and other land uses will be sought. Also to be considered are cost effective multifunctional management systems ensuring proper levels of biodiversity as well as methods for improving the value of non-wood goods and services.

- *Community forestry measures* need improved tools for their analysis and evaluation.

- *The protection, conservation and restoration of forest ecosystems* require appropriate monitoring methods and tools, adequate strategies and measures for the prevention against, and control of biotic (pests, diseases) and abiotic damaging factors. Research on prevention and control of forest fires as well as on quarantine and other harmful organisms posing a threat to the free movement of products will also be included. The role of forests on water management, erosion control, desertification and prevention of avalanches and landslides will be addressed. Finally, research will cover the specific problems of urban forestry and the impact of climate change on forests, along with adaptation to climate change, carbon cycles and CO_2 sequestration.

- *Agroforestry, cork, energy production, silvopastoral and production systems for other than wood purposes including recreation,* Research will address the development of advanced management and harvesting systems including short rotation forestry and small-scale forestry. Biomass production systems for energy including small-scale use will be developed. With respect to cork, there is a need for better understanding of the mechanisms of cork formation and of the physiological; sylvicultural and environmental factors affecting cork quality. The contribution of the above systems to rural

development and employment will be studied. Finally, the role and the specific requirements of urban forestry will be addressed.

5.3.2. Strategies for the sustainable and multipurpose utilisation of forest resources; the forestry-wood chain

-*Sustainable and diversified forestry production meeting market needs.* The industrial need for the supply of high quality and uniform raw material will be addressed through the assessment and management of genetic resources taking advantage of modern biotechnological methods. Genetic physiological, biomechanical and silvicultural processes, which affect quality, will be studied. The development of forest management systems will be sought; in particular through advanced decision support tools (e.g. advanced forest inventory methods and growth and yield models combining spatial and temporal information) and integrated supply systems and models linking raw material characteristics with market needs. The eco-efficiency of forest operations including forestation techniques and harvesting systems will also be studied.

- *Environmentally friendly and efficient processes, recycling technologies and improved value-added products*. RTD will focus on new and improved process technologies and control systems aiming at increased value yield, reduced waste, water and/or energy consumption. With respect to wood and wood based products, the relationships between the composition and quality parameters of wood with the properties of solid wood products will be studied. The impact of wood properties on processing, along with optimised recycling technologies will be investigated. The development of innovative, modified, and engineered products with enhanced properties will be considered. Concerning fibre-based products including pulp and paper, the material specifications of the fibre, its characterisation as well as fibrous networks with the aim of developing new or improved end products will be studied. There will also be focus on new processes for fibre modification and fractionation, clean processes including biotechnological approaches and closed-loop technologies, recycling technologies, less capital intensive processes, along with the enhancement of paper's functional properties.

- *Market requirements and final product characteristics.* Factors affecting the delivery of high quality products will be studied, such as labelling, comparative Life Cycle Analysis studies encompassing all steps from primary production to end-products, product performance including pre-normative research as well as the adaptation of Total Quality Management practices to the forestry-wood chain. Novel markets and product outlets will be identified. The contribution of the forestry-wood chain to rural development will be substantiated through socio-economic analysis as well as the sector's competitive position in a European and global context

5.4 Support for common policies – Development of methods of control, surveillance and protection including protection of land and prevention of soil erosion. Pre-legislative research designed to provide a scientific basis for Community legislation.

5.4.1. Community agriculture and the international context. International trade discussions and the settlement of disputes require scientific support. Farm policies in the main World Trade Organisation countries, with attention to support schemes in favour of agriculture, tariff and non-tariff trade barriers for agricultural products and trade related issues on intellectual property rights (TRIPs) need analysis both for the EU and the other WTO participating countries, along with the agricultural and agribusiness sectors in the applicant countries and the consequences and needs arising from their inclusion in the CAP.

5.4.2. CAP measures and related activities including agri-environmental and socio-economic aspects need improved normative and pre-normative tools (ex-ante and ex-post) for controlling CAP measures, agricultural production, the protection of land and prevention of soil erosion as well as the quality of products and products processed on the farm; forecasting the development of agriculture and related sectors, identifying the necessary adjustments in the CAP and evaluating the potential impact of policy decisions; the improvement of existing models and development of smaller ones adapted to sectorial needs. Agri-environmental measures require improved and innovative monitoring, evaluation tools (including agri-environmental indicators) and understanding. Finally, the analysis of interactions between agri-environmental, rural development, forestry, and CAP measures and an increased co-operation between Community and national research activities are necessary.

5.4.3. Monitoring and enforcement of the CFP: Research will focus on improving the collection and interpretation of data for resources assessment and management and on anticipating the reactions of economic and social sectors to regulations. It will develop cost-effective methods to ensure implementation of regulations and will improve efficiency and accuracy of resource assessment and monitoring. It will also develop methodologies to establish legally indisputable evidence for the origin of fish and fish products and to monitor and control the potential risks of emerging diseases in aquaculture.

5.4.4. Social and economic basis of the CFP: Research will develop methodologies to identify and analyse the social and economic factors affecting the different sectors of coastal communities. It will assess the economic consequences of interactions between resource management, structural interventions, market support mechanisms and financial incentives in the different economic sectors. It will assess the compatibility of different biological, economic and social objectives of fisheries management, and will compare alternative management strategies.

5.5. New tools and models for the integrated and sustainable development of rural and other relevant areas

RTD will address rural and other relevant areas, encompassing mountain and coastal areas.

5.5.1. Analysing rural situations, changes and trends, require for each type of rural areas, multi-sectoral analyses; identification of strengths, weaknesses, opportunities and threats as well as the development of scenarios and the analysis of rural-urban interrelationships and typologies of areas, to identify meaningful spatial entities for development analyses. Actions being undertaken in endogenous and exogenous rural development approaches will be investigated with a view to establish models of effective practice and their transferability across regions of the EU. Landscape management and valorisation as related to important ecosystems, habitats, cultural heritage and recreational activities will be addressed as well as the current situation and prospects of multifunctional agriculture, together with new indicators and parameters for assessing the relative importance of agriculture and forestry. Tools and methods to assess the contribution of aquaculture and fisheries to the development of coastal areas and their socio-economic interactions with other competing sectors will be developed.

5.5.2. Conceptualising integrated development of rural and other relevant areas, implies understanding the potential of new information and communications technologies for the development of rural economies; the impacts of infrastructure and public services; the role of rural amenities, cultural and natural heritage; the emergence of entrepreneurship in rural areas; the rates of new enterprise formation and survival, especially micro-enterprises; restructuring in the global economy and its impact on rural areas; market reorganisation and its impact on production and marketing in disadvantaged rural regions. Options and strategies for integrated resource utilisation in different rural regions will be developed, as well as methods to obtain participation of population and local actors in rural development processes, and strategies and tools for the transfer of experience, innovation and knowledge are needed.

5.5.3. Assessing rural and coastal development performance and policies, implies improvement of specific tools for baseline description, forecasting, monitoring and evaluation of projects, measures, programmes and policies, including for those related to the improvement of agricultural structures; comparative efficiency analyses of institutional structures and procedures in order to define the appropriate levels of intervention and patterns of partnerships; changes perceptions and attitudes concerning rural development issues; the role of social capital, territorial identity and image, local participation and empowerment as preconditions for rural development strategies; synergetic effects and improved methods for measuring positive and negative externalities of rural development; development and application of tools and methods to assess regional or local impacts exerted by structural aids to the fisheries and aquaculture sectors.

KEY ACTION 6: The Ageing Population and Disabilities

OBJECTIVES AND DELIVERABLES

The ageing of Europe's population will be a crucial challenge for the 21st century. Society will have to face three major issues: first, increasing numbers of active older people demanding new social structures and opportunities; second, increasing numbers of disabled older people requiring new

interventions and improved health and social care with the resulting economic consequences; and third, complex economic, technological, organisational and social challenges involved in the ageing of society. For society to cope with and indeed benefit from these changes, innovative social, organisational and technological responses are needed.

A global objective of this key action is to raise the issue of "The Ageing Population" as a priority subject for Community-wide cross-sectoral multidisciplinary research, combining and integrating efforts in the biological, biomedical, psychological, economic and social fields. More specific objectives and deliverables are:

- **To promote healthy ageing**

  Anticipated deliverables: identification of major factors governing the ageing process as a means of promoting healthy ageing, delaying the onset of disability and preventing frailty.

- **To improve the management of age-related illnesses and to cope better with disability**

  Anticipated deliverables: improved methods to prevent, delay the onset, diagnose and treat major illnesses and disabling conditions of older people; more competitive and adapted technological products and services for coping with disability and for promoting the quality of life, autonomy and social integration of older people.

- **To improve the basis for the policy and planning of social welfare systems**

  Anticipated deliverables: improved tools for analysing the implications of population ageing on the sustainability of social welfare systems; improved and economically sustainable modes of delivering health and social care to older people.

To date, health systems have been largely oriented to extending life. This key action will focus more on reducing morbidity and coping with disability, targeting the development of treatments, technologies and systems to prevent incapacitating diseases, to extend the quality of life and to enhance the functional independence of older people.

This key action adopts a problem-solving approach, in which it aims "to put research to work" to meet the challenges posed by both the ageing of individuals and the ageing of society.

PRIORITIES FOR THE 2000 EVALUATION ROUND[3]

In order to ensure a balanced approach to the challenges facing society from an ageing population, one-half of the budget available for the key action in this next call for proposals will be committed on action lines 6.1 and 6.2 and the other half on 6.3, 6.4 and 6.5 (subject to the receipt of sufficient proposals of both high scientific and technological quality and relevance in each of these two parts of the key action).

6.1. Age-related illnesses and health problems

This action line focuses on creating European added value in research of clinical significance for the early detection, prevention or delay in onset, and treatment of age-related diseases and disorders of high morbidity among older people. In particular, it will sponsor the coordination of research projects already funded at the national and international levels and the networking of research teams with the stakeholders in the research. Priorities are:

- comorbidity, including multiple minor disorders;
- nervous system: stroke, Alzheimer's disease and other senile dementias, depression, Parkinson's disease and peripheral neuropathies;
- musculoskeletal system: osteoporosis and degenerative joint diseases;
- urogenital system: incontinence and prostate disorders;
- sensory systems: visual and auditory impairments.

Note that, for the year 2000, this action line will support only concerted actions, thematic networks and accompanying measures, except for diseases and disorders of the urogenital system where RTD

[3] Please note that other age-related research topics are covered elsewhere in the QoL Programme, for example, cardiovascular disease and cancers in the Generic Activities, nutrition in Key Action 1 and vaccination strategies in Key Action 2.

projects will also be supported. Successful proposals must contain a strong representation from clinical research. Thematic networks that bring together the research sector with the health and social care sectors and with representatives of older people are encouraged, particularly with a view to stimulating the formation of multidisciplinary, cross-sectoral RTD proposals to later calls for proposals.

For the year 2001, this action line will again be open more widely to support RTD projects, as well as to concerted actions, thematic networks and accompanying measures. Among the topics that will be open for RTD projects in 2001 are visual and auditory impairment, and comorbidity, especially of multiple minor disorders and depression.

6.2. Determinants of healthy ageing and of well-being in old age

This action line aims at improving understanding of the social, cultural, gender, biological and behavioural factors governing the ageing process (including lifestyle, nutrition, physical activity, social environment, education, and financial and other resources) in order to strengthen the evidence base for public health strategies to promote both healthy ageing of the population at large and the well-being, autonomy and independence of older people. Priorities are:

- the socioeconomic, cultural, psychological and behavioural determinants of healthy ageing and of well-being in old age;
- the biological mechanisms underlying the physiological processes of ageing, including model studies (but excluding the pathogenesis of specific diseases);
- epidemiological and socioeconomic studies, including longitudinal and cohort studies (in particular, of the oldest old), on the determinants of healthy ageing and of well-being in old age;

The action line will support RTD projects, concerted actions, thematic networks and accompanying measures. Studies of determinants should, as far as practicable, involve relevant health and social care practitioners and representatives of older people.

6.3. Demographic and social policy aspects of population ageing

As a basis for socio-economic policy and planning in the light of the demographic changes that are expected, this action line concentrates on predicting the evolution of pertinent characteristics of the ageing population and on examining the impact of population ageing on society. Priorities are:

- population studies aimed at predicting future socio-economic consequences and policy-relevant characteristics of an ageing population (including functional status, health and care status, dependency, housing and household status, economic status);
- policy-relevant socioeconomic studies on the impact of population ageing: (a) on economic growth and on the labour market in particular, including studies of policy-relevant issues that might influence the future participation of older workers in the labour market; (b) on the well-being of different groups in society and on social cohesion; and (c) on the sustainability of social welfare systems.

These aspects will be supported through RTD projects, concerted actions, thematic networks and accompanying measures. Comparative analyses at national and regional levels addressing the diversity of socio-economic and cultural contexts across Europe are encouraged. Projects should involve, as far as practicable, representatives of older people.

This action line will also support, through thematic networks, transnational cooperation on the development of comparable data sets needed for Community-wide studies of the socio-economic impact of population ageing.

6.4. Coping with functional limitations in old age

This action line supports the development and evaluation of technologies and services designed to reduce the impact of disabilities on older people, to restore their functions and to mitigate the challenge to them of their social and physical environments. Priorities are:

- technological products and services contributing to greater mobility and less dependency, both inside and outside the home;
- ergonomic and user-friendly caring and nursing products designed to support older people in their own homes;

- stimulating the capacity for self-care by older people;
- improving postural stability and preventing falls;
- geriatric rehabilitation therapies and aids to rehabilitation;
- optimum forms of physical and cognitive exercise.

This action line is complemented by work in the Key Action on Systems and Services for the Citizen in the Information Society Technologies Programme and therefore excludes support for projects where the predominant activity is the development or application of new information, communication or robotic technologies. However, the application of such mature technologies will be considered within the scope of this action line.

The action line will support RTD projects, demonstration projects (in particular, for the evaluation of new technologies and services), concerted actions, thematic networks and accompanying measures. Projects should be application-oriented and should involve, as far as practicable, the active participation of industry and of end-users.

6.5. Health and social care services to older people

This action line aims at contributing to the evolution of effective, efficient and user-friendly care services for older people, by supporting comparative evaluation and research into the organisation and delivery of care. Priorities are:

- the efficiency, quality and user-acceptability of different modes of health and social care organisation and delivery;
- health care outcomes research for older people;
- the role and needs of care-givers, particularly family and friends and the voluntary sector, and their relation to the formal care sector;
- the impact of developments in the social economy (including the voluntary sector) in relation to the formal provision of health and social care;
- reducing the demand for long-term care, particularly by mobilising a combination of services at the local level, or by promoting different housing arrangements and living environments, in order to enable people to stay in their own homes.

The action line will support RTD projects, demonstration projects, concerted actions, thematic networks and accompanying measures. Comparative analyses should take advantage of the diversity in health and social care at national and regional levels, addressing the different social, cultural and institutional contexts across Europe. Projects should involve, as far as practicable, health and social care practitioners and representatives of older people and of their carers.

RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES OF A GENERIC NATURE

These activities aim to reinforce the knowledge base in chosen areas of strategic but generic importance for the Life Sciences related to humans, animals (both terrestrial and aquatic) and plants. This is in contrast to the mission oriented problem solving approach in the Key Actions, which place the emphasis on the linkage between discovery and exploitation.

Projects will be encouraged that promote interaction between basic and applied research and that involve both the research and health sectors in order to ensure maximum transfer of knowledge between research and its users, including industry. The networking of projects will also be promoted in order to create a critical mass for optimum exploitation of results.

SCOPE OF THE YEAR 2000 DEADLINE

In order to contain over-subscription, only the following parts of the Generic Activities will be open for the year 2000 deadline: Areas 7.1, 8.1, 8.2, 9.1, 9.2, 10, 11, 12, and 13. The remaining, i.e. Areas 7.2, 7.3, 8.3, 8.4, 9.3, and 9.4, will be open, among others, in the call for proposals relating to the year 2001 deadline.

7. Chronic and Degenerative Diseases, Cancer, Diabetes, Cardiovascular Diseases and Rare Diseases

OBJECTIVES

The main objective of this generic activity is to reduce the impact of human multifactorial diseases[4] both on individuals and populations by fostering the integration of basic and clinical research aimed at: a) elucidating the contribution of the cellular, molecular, genetic, environmental and lifestyle factors which determine disease; b) integrating different disciplines and advanced technologies to develop effective approaches to prevention, diagnosis and treatment.

Many of these diseases share a common multifactorial aetiology through the combination of multiple risk factors and similar basic mechanisms of initiation, progression and maintenance so that scientific progress in one disease will enhance understanding of others. In that context, this call for proposals will give priority to multidisciplinary research into shared mechanisms underlying multifactorial diseases. Priorities are:

7.1. Elucidation of the common underlying pathogenic mechanisms involved in disease initiation, progression and maintenance concentrating on three main approaches: (i) mechanisms of inter and intracellular signalling involved in disease processes, their role and interactions; (ii) cell proliferation, differentiation, regulation and disregulation, migration, injury, repair, apoptosis and death and their implications in disease development as well as the role of immunity, inflammatory processes, angiogenic mechanisms and metabolic factors and defects (early markers of cell dysfunction); (iii) modelling of disease processes through cellular, tissue, animal and *in silico* models and their validation in humans; (iv) understanding of how metabolic, genetic and environmental factors (including the evaluation of the role that those play in different European populations) for specific diseases cause pathophysiological effects.

7.2. Evaluation of conventional and non-conventional therapies through multinational, large scale studies/trials (open in 2001)

7.3. Optimised use of relevant databases, registries, repositories (open in 2001, but see area 14).

[4]Excluding neurological and mental disorders which will be covered within area 9

8. Research into Genomes and diseases of genetic origin

OBJECTIVES

The aim of this generic activity is to identify the biological functions of genes and to improve the interpretation of sequence information in animal-, microbial- and plant-model genomes[5] and in the human genome. The new knowledge and technologies deriving from this research should promote the exploitation of genomic information to the benefit of health, industry, agriculture, fisheries and aquaculture. Priorities are:

8.1. Genome analysis. Research should be aimed at: (i) improvement of the knowledge and understanding of the genetic structure and molecular evolution of genomes; (ii) systematic investigation using genome wide technologies of monogenic and complex human genetic traits (common and rare) ; (iii) identification and characterisation of new susceptibility and modifier genes; (iv) characterisation of genotype / phenotype relationships, including the development and application of novel biochemical and physical methods for rapid phenotyping in humans and model animals; (v) investigation and development of new pharmaco-therapeutic approaches based on genomic knowledge. (vi) improving the understanding of genes relevant to human disease, risk factors and complex regulation through population sequencing.

8.2. Functional genomics and proteomics. The focus will be on topics contributing to the functional interpretation of the human genome and model genomes relevant to human health, agriculture, fisheries and aquaculture. Emphasis will be placed on comparative genome analysis, on the development of high-throughput methods, as well as on the integration of laboratory and computational approaches: (i) multi-level analysis of the expression, function and interaction of genes; (ii) control and regulation of gene expression, e.g. through feedback networks, long range interactions or positional effects, and its deregulation in disease; (iii) definition of protein families and interacting pathways; (iv) development of new technologies for prediction of protein structure and the dissection of protein interactions, variation and isoforms as well as large scale proteomics; (v) development of portable bioinformatic tools for the collection and analysis of genomic structural and functional data, and for the integration of genomic and phenotypic data.

8.3. Development of novel expression systems, model organisms, mutant, transgenic and hybrid organisms (open in 2001)

8.4. Development and application of underpinning biochemistry, biophysical, statistical and computational approaches (open in 2001, but see area 14).

9. Neurosciences

OBJECTIVES

The main objectives of this generic activity are: (i) to provide a better understanding of the nervous system in animals and humans, the mechanisms governing biological and psychological processes and their interrelationship; (ii) to promote new diagnostic, preventive and therapeutic approaches to neurological and mental disorders and enhance transfer of knowledge on neuro- and psychopharmacology to pharmaceutical industry; (iii) to provide new education and learning tools; and (iv) to explore synergies between neuroscience and information technologies. A key feature of this action line will be the integration of theoretical and experimental approaches, of basic and clinical research, of diverse disciplines and levels of organisation (i.e. genetic and molecular, cellular, physiological and psychological systems, the individual, populations) while recognising that no one proposal need contain all of these. Considering the unique skills encompassed by the Human Frontier Science Programme, a contribution will be made available for the whole duration of the 5th Framework Programme. Priorities are:

9.1 Cell communication, addressing four topics: (i) understanding how the nervous system carries out signal recognition and transduction at the molecular level and exploits and regulates the diversity of signalling molecules; (ii) elucidating the links between molecules involved in intra- and inter-cellular

[5] Model genomes are here defined as those generally accepted for generic research where the knowledge gained provides insight to genomes of other organisms.

signalling as well as in neuronal integration in normal and pathological states, including links between the nervous, endocrine and immune systems; (iii) understanding the reward mechanisms common to central actions of drugs (which create dependance), nicotine and alcohol; iv) understanding the mechanisms of memory, learning and recall.

9.2 Brain theories, computational neuroscience and neuroinformatics, covering three domains: (i) development and validation of theoretical concepts and models of brain functions at various levels; (ii) understanding of how real networks of neurones solve problems; (iii) investigating methods that enable construction of "machines that live" i.e. machines with automatic adaptation beyond programming alone; (iv) development of computational approaches, including database technologies, with the potential of integrating data from molecular to behavioural levels.[6]

9.3 Brain development, disorders and repair and their clinical, epidemiological and social implications (open in 2001)

9.4 Behaviour, cognition and functional mapping of the brain (open in 2001)

10. Public health and health services research

10.1. Health services research and health and safety at work

Objectives

Research will aim to improve the health of European citizens by supporting Community activities in the fields of health services research, and health and safety at work.

Priorities are: (i) to analyse the effectiveness, including cost-effectiveness of health interventions, health promotion and prevention; (ii) to analyse the variations in health care models and inequalities in health status among European countries; (iii) to analyse socio-economic and organisational aspects of health care systems, services, and health policy initiatives; (iv) to evaluate the effectiveness of non-conventional therapies; (v) to develop more sophisticated methods in epidemiology; (vi) to acquire evidence for best practice in disease management for health policy decision-making; (vii) to identify aetiology of occupational accidents, in particular for specific high risk situations for individuals, enterprise and society; (viii) to determine exposure to and influence of physical and mental stress at work.

10.2 Fighting drug related problems

Objectives

To prevent and control health and social problems for the individual and society related to drugs[7] including doping agents in sport, alcohol and nicotine.

Priorities are: (i) to determine the social, psychological and socio-economic factors related to hazardous use and dependence; (ii) to develop better understanding of the long-term health and social consequences of consumption; (iii) to evaluate current prevention and treatment programmes, to develop more effective treatment strategies; (vi) to undertake epidemiological research for demand reduction such as morbidity/mortality studies, longitudinal development of behaviour and disease, identification of risk groups; (v) to undertake research on the traceable variations of biological profiles in blood or other body fluids (biochemical, hormonal, cell formula etc) induced by doping substances in view of their use as screening targets to detect doping.

11. Research relating to persons with disabilities

OBJECTIVES

The aim of this activity is to enhance the quality of life and the independence of persons with physical and mental disabilities[8], taking into account their expectations and the greater contributions they could make to society. Priorities are:

[6] Concerning database technologies the QoL programme will not provide support for the collection of data (unless the collection is an integral component of the research in a RTD project).

[7] Drugs refer to natural or synthetic substances listed in the three UN Conventions from 1961, 1971 and 1988.

11.1 Determinants of impairment, disability and handicap and their inter-relationships, including research into the physiological, psychological, social and educational needs of persons with disabilities.

11.2 Methodologies for the assessment of quality of life from the perspective of persons with disabilities, that is, in terms of personal and social well being, with special emphasis on health and social care and medical treatments.

11.3 Innovative technological research for the rehabilitation and assistance of persons with disabilities, taking into account the wide variety of user needs.

11.4 Health and social care delivery with a focus on: (i) models for improved effectiveness and efficiency of delivery to persons with disabilities according to the specificities of their impairments; (ii) analysis and comparison of various modalities, such as institutional, community and informal care, and efficacy of distance healthcare; (iii) methodologies for outcome measurement and assessment; predictive models for future needs for health and social care. Special attention will be given to how persons with disabilities age and the implications for health and social care.

Applicants should note that projects where the predominant activity is the development or application of new information, communication and robotic technologies and those focusing more specifically on age-related disabilities will be excluded from support under this action line.

12. Bioethics

OBJECTIVES

This generic activity responds to ethical concerns arising out of rapid developments in the life sciences in the context of respect for fundamental human values. Interdisciplinary research will have the following main objectives: (i) to develop an ethical framework for research and to clarify the responsibilities of researchers, policy makers and economic actors; (ii) to contribute to a balanced dialogue between the public and the actors in the field, and an increased public awareness and consultation on ethical issues taking into account different sociocultural contexts; (iii) to help inform decision makers and citizens with regard to appropriate policy options, and to anticipate and address questions raised by scientific and technological developments, including those arising from this programme; (iv) to create and support pan-European networks of ethical expertise. Priorities are:

12.1. Ethical aspects of scientific and technological developments, notably: (i) the human genome, genetic testing and screening, testing for predisposition, and the human genetic diversity; (ii) the use of information technology in medicine; (iii) the use of modern technologies and methods in plant and animal breeding; (iv) xenotransplantation.

12.2. Ethical framework for life sciences, notably: (i) the involvement of human beings in research, in particular children, vulnerable groups and people in developing countries; (ii) the use of human cell tissues (including foetal tissues); (iii) the use of animals in research, in particular non-human primates; (iv) ethical conduct of research and issues linked with the dissemination of results.

12.3. Public policies, law and bioethics, notably: (i) bioethics in education systems and professional training; (ii) ethical aspects of public health policies, including end of life issues and of resource allocation in health services and drug addiction; (iii) ethical aspects of consumer, environment, animal welfare and agriculture policies, including issues related to the Biodiversity Convention; (iv) research on links between bioethics and legislation (Community legislation, international treaties and declarations on bioethics, intellectual property rights, development of patent law and practice in the field of biotechnology and its impact on the protection of human rights, consequences of citizens' ethical concerns for international trade relations).

12.4. Bioethics infrastructures and methodologies, notably: (i) comparative analysis of competencies and methodologies used by national, local and international ethics committees; (ii) networking of information infrastructures on legal and ethical data and associated methodologies; (iii) concepts of European and universal ethical standards and their relation with national and regional ethical values.

[8] Disabilities will be defined according to the ICIDH (International Classification of Impairments, Disabilities and Handicaps) of the WHO (World Health Organization), taking into account the current initiative to revise it (ICIDH-2).

13. Socio-economic aspects of life sciences and technologies

OBJECTIVES

This generic activity aims to encourage research into aspects of life sciences and technologies within the perspective of sustainable development. This is in order to provide useful information to policy makers both in the Member States and at Community level, and also in order to promote the public debate. Priorities are:

13.1 Development of indicators and knowledge bases relevant to public policy making, covering: (i) analysis of RTD strategies in the public and private sector; (ii) technology evaluation and assessment to provide for potential applications and their likely impact on existing and emerging sectors; (iii) social and cultural perceptions and the shaping of new technologies.

13.2 Managing technology in society: (i) research on the implications of new technologies for policies (including monitoring and control) in the field of pharmaceuticals and health care, agriculture, agro-food industry and environment; (ii) the impact of research in the life sciences and technologies on those groups in society most likely to be affected (for example, the insurability and employability of those groups carrying specific genetic traits).

13.3 Analysis of social and economic driving forces and of new opportunities in the bioindustries, including: (i) studies on the existing and potential impacts of life sciences and technologies on industrial and economic growth, competitiveness and job creation; (ii) analyses of the innovation systems in Europe, including research on how geographic concentration of innovation creators and users helps generate dynamic bioindustries; iii) research on intellectual property rights and the importance of intellectual property protection; (iv) research on the availability of investment capital and human resources; (v) research on the effect of regulations on the development of Europe's bioindustries.

SUPPORT FOR RESEARCH INFRASTRUCTURES

14. Support for research infrastructures

Within the QoL Programme, the term "research infrastructures" refers to facilities and resources that provide essential services to the research community in the life sciences. The objectives of the Programme in supporting research infrastructures (in this action line as well as elsewhere in the Programme where research infrastructures are supported) are: (i) to encourage the optimum use of Europe's research infrastructures, notably by fostering transnational cooperation in their rational and cost-effective use and development and, in conjunction with the QoL system of Marie Curie Fellowships, by broadening access to these infrastructures particularly for young researchers; (ii) to improve the European-wide consistency and complementarity of these infrastructures and their competitiveness at world level; and (iii) to help improve the quality and user-orientation of services offered to the European research community. The role of the Programme's activities in support for research infrastructures is to add value at the European level in the context that the construction and operation of research infrastructures is the responsibility of national authorities.

This particular action of the QoL Programme will provide support for research infrastructures in the following fields:

14.1. Biological collections notably: (i) microbial collections; (ii) repositories of living and non-living specimens, including mutants and strains (e.g. mouse) and other genetic models, (iii) genetic materials (vectors, genes, DNA, chromosomes); (iv) reference collections for age determination or validation of aquatic organisms.

14.2. Biological information resources notably: (i) molecular and genomic databases, as well as biodiversity and taxonomic databases, particularly in the context of international actions; (ii) platforms providing linkages through the biological information chain, from factual data to print media; (iii) fisheries databases: catches, discards, selectivity, tagging, etc; (iv) databases on forest genetic resources, tree improvement programmes and forest ecosystem dynamics.

14.3. Clinical research facilities notably: (i) facilities for the development and validation of drugs, vaccines, methods and devices for improved diagnosis, monitoring and therapy, particularly for diseases of major concern in Europe; (ii) high-level clinical and pre-clinical containment facilities; (iii) advanced medical technology facilities and infrastructures for standardised multi-centre clinical trials; (iv) registries and pooled databases of clinical trials; (v) European facilities for batch production for clinical trials.

14.4.Pre-clinical research facilities notably: facilities for development of *in-vitro* systems or cell cultures and, where no other means exist, breeding of animals, including non-human primates, to provide models of human diseases and facilitate development of vaccines, new drugs and medical devices.

14.5. Facilities for aquaculture and fishery research notably: (i) fishery research vessels for biological surveys; (ii) flume tanks for experiments to improve fishing gear selectivity; (iii) aquaculture laboratories and basins for genetic experiments and pathological trials; (iv) facilities for standardisation of diagnoses and validation of markers for fisheries management purposes.

Furthermore, classes of research infrastructures eligible for support within the RTD activities of a generic nature will also be considered eligible under this action whenever there is no relevant call for proposals open under those activities.

It should be noted that the QoL Programme will not provide support for tasks that involve the construction and routine operation of research infrastructures, nor for the collection of data (unless the collection is an integral component of the research in an infrastructure RTD project). The cost of activities aimed at stimulating the introduction and use of trans-European broadband communication networks for research will however be considered eligible.

ANNEXES

Annex I: Selection Criteria

Annex II : Roadmap

Annex III. Coordination

Annex I: Selection Criteria

RTD actions have to be selected according to criteria reflecting the overall objectives of the programme. These criteria, to be respected by all research activities within this programme, have been designed applying the selection criteria set for FP 5. The criteria are grouped in five categories :

Scientific / Technological quality and innovation			**Resources, Partnership and Management**			**Community added value and contribution to EU policies**			**Contribution to Community social objectives**			**Economic development and S&T prospects**		
The ***quality*** *of the research proposed*	*The originality,* ***degree of innovation*** *and progress beyond the state of the art*	*The* ***adequacy*** *of the chosen approach, methodology and work plan*	*The* ***quality of the management and project approach*** *proposed*	*The* ***quality of the partnership*** *and involvement of users and/or other actors in the field when appropriate*	*The* ***appropriateness of the resources***	*The* ***European dimension of the problem***	*The* ***European added value of the consortium***	*The contribution to the implementation or the evolution of one or more* ***EU policies*** *or addressing problems connected with standardisation and regulation*	*The contribution to improving the* ***quality of life and health and safety****; ethical issues and safeguards*	*Where relevant to the action, the contribution to improving* ***employment*** *prospects and the use and development of skills*	*Where relevant to the action, the contribution to* ***preserving and/or enhancing the environment****; environment impact assessment where relevant*	*The possible contribution to growth, in particular the* ***usefulness and rangeof applications*** *and quality of the* ***exploitation plans***	*Where relevant to the action, the* ***strategic impact*** *of the proposed project and its potential to improve competitiveness*	*The contribution to European technological progress and the* ***dissemination strategies*** *for the expected results*

According to the needs and the types of action, different emphasis might however be given to these different categories of selection criteria or to different criteria within a category. Details will be specified in the evaluation manual.

These criteria should also be respected during the execution of the research activities in order to achieve overall excellence and consistency. They will be used to assess activities and help quantify impacts, providing information that will enable a timely and appropriate programme management response. The evaluation of the potential impact of new knowledge, technologies, products, processes or materials resulting from RTD actions will be a permanent activity of this programme, ensuring in this way an effective implementation of the Council decision.

The above selection criteria will be applied, where appropriate, in the light of ethical and other considerations with a significant bearing on the impact for society of the life sciences. The evaluation manual for this programme clearly develops several of these considerations. However, in order to shed further light on the ways in which selection criteria impinge on European competitiveness and quality of life, particular emphasis must be placed on the desirability of ensuring a high level of ethical awareness at the proposal submission stage.

Proposals must respect fundamental ethical principles including human rights and animal welfare requirements, pursuant to footnote on ethics in the Decision of Council and Parliament of 22/12/98 adopting the 5th Framework Programme. They should provide the minimum amount of information for reviewers to form their independent opinion on the level of awareness, and the existence of adequate provisions where necessary, as shown by project participants. In particular, research should comply with all relevant national and international laws, conventions and codes of conduct and, where appropriate, have the explicit approval of local or national research ethics or animal welfare committees.

Annex II: Roadmap

– The following pages present in a tabular form the calendar of calls for proposals with indication of: the areas in the Work Programme concerned, dates of the publication, deadlines for submission and an indicative budget breakdown.

– The following provision are of general application:

« The competent Director general is allowed to modify the launching date of the calls for proposals by more or less one month. In that case, a notice will be published in the Official journal of the European Communities at the date initially scheduled for the call for proposals and the deadlines for submitting proposals will be changed accordingly. The notice will inform the potential applicants of such postponement. »

« The Commission reserves the right not to commit all the budget available for each call ».

II - QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES

ROADMAP 2000

TYPE OF ACTIVITY			Indicative budget available per activity per deadline in millions of		Date of publication in the O.J.: 15/12/1999 Deadlines for submitting proposals*	
					March	October
					15	11
KEY ACTIONS			**March**	**October**		
TITLES	**AREAS**					
1. Food, nutrition and health	1.1/1.2 Food raw materials, processes, traceability; food safety		31	39		x
	1.3 Role of food in promoting and sustaining health				x	
2. Control of infectious diseases	2.1/2.2/2.3 Development of vaccines; new strategies for treatment and prevention; public health issues		-	70		x
3. The "Cell Factory"	3.1 Improving the diagnostic and therapeutic arsenal for health care	3.1.1 Development of new diagnostics	43	47		x
		3.1.2 Therapeutic substances			x	
		3.1.3 Therapeutic strategies				x
		3.1.4 Novel in-vitro testing as alternatives to animal testing			x	
	3.2 Improving environmental sustainability	3.2.1 New bioprocesses for industrial efficiency, to avoid pollution, make use of bioaccumulable wastes and by-products, and treat waste water			x	
		3.2.2 Bioassays and biosensors				x
		3.2.3 Biodegradation of recalcitrants chemicals and bioremediation			x	
		3.2.4 Biodiversity and ecological dynamics of natural and introduced populations				x
		3.2.5 Methods and strategies for safe use of new biomolecules and bioprocesses, for identifying recombinant organisms and their residues in the environment and assessing their impact on human and animal health, to support Community policies				x
	3.3 New biological and biotechnological products and processes for agro-industry, agri-food and high value added chemicals	3.3.2 High value-added products and processes involving/derived from microbes, plants and animals			x	
		3.3.3 Functional biomolecules and biocatalysts			x	
		3.3.4 Identification and sustainable use of metabolic and genetic diversity as a source of valuable products				x
4. Environment and Health	4.1 Diseases and allergies related to the environment		36	-	x	
	4.2 Assessment and reduction of environmental health hazards				x	
5. Sustainable agriculture, fisheries and forestry and integrated development of rural areas, including mountain areas	5.2 The integrated production and exploitation of biological materials for non-food uses		43		x	
	5.3 Sustainable and multipurpose utilization of forest resources					
	5.4 Support for common policies	5.4.1 Community agriculture and the international context				
		5.4.2 CAP measures and related activities including socio-economic aspects				
	5.1 New and sustainable systems of production, including breeding methods in agriculture, fisheries and aquaculture			79		x
	5.4 Support for common policies	5.4.3 Monitoring and enforcement of the CFP				
		5.4.4 Social and economic basis of the CFP				
	5.5 New tools and models for the integrated and sustainable development of rural and other relevant areas					
6. The ageing population	6.1/6.2/6.3/6.4/6.5 Age-related illnesses and health problems; determinants of healthy ageing; demography and epidemiology of ageing; coping with functional limitations in old age; health and social care services to older people		39 ***	-	x	
RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES OF A GENERIC NATURE**			-	113		x
Indicative budget in millions of per deadline:			**192**	**348**		

* The competent Director general is allowed to launch a second call for proposals when the proposals of the first call cannot meet the objectives of the programme.

Only research and technological development projects, demonstration projects, combined RTD/demonstration projects, thematic networks and concerted actions can be submitted, except for research priority 6.1. Age-related illnesses and health problems. For this research priority, please refer to the detailed description of Key Action 6.

** An expanded version of the table for Generic activities is shown in the next page, describing a finer sub-division of sub-areas either closed or open.

*** One-half of the budget available for the key action will be committed on action lines 6.1 and 6.2 and the other half on 6.3, 6.4 and 6.5 (subject to the receipt of sufficient proposals of both high scientific and technological quality and relevance in each of these two parts of the key action).

ROADMAP 2000 EXPANDED TABLE FOR GENERIC ACTIVITIES

TYPE OF ACTIVITY		Deadlines for submitting proposals	
		Mar 15th	Oct 11th
RESEARCH AND TECHNOLOGICAL DEVELOMENT ACTIVITIES OF A GENERIC NATURE			
SHORT TITLES	**AREAS**		
7. Chronic, degenerative and rare diseases	7.1 Common underlying pathogenic mechanisms		x
8. Genomes and diseases of genetic origin	8.1/8.2 Genome analysis, functional genomics and proteomics		x
9. Neurosciences	9.1/9.2 Cell communication; brain theories		x
10. Public health and health services research	10.1 Health services research, health and saftey at work		x
	10.2 Fighting drug related problems		x
11. Research relating to persons with disabilities			x
12. Bioethics			x
13. Socio-economic aspects			x

ACTIVITIES INVITED THROUGH AN OPEN CALL

TYPE OF ACTION		Indicative budget available for proposals to be evaluated in 1999 in millions of Euros	Indicative budget available for proposals to be evaluated in 2000 in millions of Euros	Indicative budget available for proposals to be evaluated in 2001 in millions of Euros	Indicative budget available for proposals to be evaluated in 2002 in millions of Euros	Date of publication in the O.J.: 6/03/99, 12/08/99 and 15/12/99 Proposals will be evaluated by batches according the following cut-off dates
TRAINING FELLOWSHIPS						
TITLES	**AREAS**					
Individual Fellowships	Marie Curie Individual Fellowships	**39**	**39**	**39**	**9**	2/06/99, 3/11/99, 12/04/2000, 11/10/2000, 11/04/2001, 10/10/2001, 10/04/2002
	Return Fellowships					
	Experienced Researcher's Fellowships					
Marie Curie Host Fellowships	Training sites					11/10/99, 1/2/2000, 1/2/2001
	Industry host fellowships					
TECHNOLOGY STIMULATION TO ENCOURAGE AND FACILITATE SME PARTICIPATION IN RTD ACTIVITIES						
SME Exploratory Awards		**20**	**20**	**20**	**20**	14/04/99, 15/09/99, 12/01/2000, 26/04/2000, 13/09/2000, 17/01/2001, 18/04/2001
Cooperative research						14/04/99, 15/09/99, 12/01/2000, 26/04/2000, 13/09/2000, 17/01/2001, 18/04/2001, 19/09/2001, 16/01/2002, 17/04/2002
ACCOMPANYING MEASURES *						
Studies in support of the specific program, the exchange of information, conferences, seminars, workshops and scientific and technical meetings, dissemination, information and communication activities. These may include activities addressing the development of methodologies for assessing impact of the programme and activities of enhancing co-ordination and synergy within Europe (among Member States and the Commission)		**7**	**10**	**10**	**10**	15/04/99, 11/10/99, 10/2/2000, 12/06/2000,11/10/2000, 9/2/2001, 12/06/2001, 11/10/2001, 8/2/2002, 12/06/2002
TYPE OF ACTIVITY						
SUPPORT FOR RESEARCH INFRASTRUCTURES						
TITLES	**AREAS**					
Research infrastructures		**20**	**16**	**17**	**8**	1/06/99, 15/11/99, 15/3/2000, 11/10/2000, 9/2/2001, 11/10/2001, 8/2/2002

* Proposals for accompanying measures sent from 11 February 2000 onwards will have to plan a starting date for the intended project at least six months after the evaluation date set for the batch of proposals in which they appear.

In specific cases, accompanying measures may also be the subject of spontaneous applications for a subsidy.

INDICATIVE ROADMAP FOR 2001-2002

TYPE OF ACTIVITY			Indicative budget available per activity per deadline in millions of			Deadlines for submitting proposals		
KEY ACTIONS			Mar. 2001	Oct. 2001	Mar. 2002	Mar. 2001	Oct. 2001	Mar. 2002
TITLES	AREAS							
1. Food, nutrition and health	1.1/1.2 Food raw materials, processes, traceability; food safety		33	-	60			x
	1.3 Role of food in promoting and sustaining health					x		x
2. Control of infectious diseases	2.1/2.2/2.3 Development of vaccines; new strategies for treatment and prevention; public health issues		-	73	-		x	
3. The "Cell Factory"	3.1 Improving the diagnostic and therapeutic arsenal for health care	3.1.1 Development of new diagnostics	47	49	49		x	x
		3.1.2 Therapeutic substances				x		x
		3.1.3 Therapeutic strategies					x	x
		3.1.4 Novel in-vitro testing as alternatives to animal testing				x		x
	3.2 Improving environmental sustainability	3.2.1 New bioprocesses for industrial efficiency, to avoid pollution, make use of bioaccumulable wastes and by-products, and treat waste water				x		
		3.2.2 Bioassays and biosensors						x
		3.2.3 Biodegradation of recalcitrants chemicals and bioremediation				x		
		3.2.4 Biodiversity and ecological dynamics of natural and introduced populations						x
		3.2.5 Methods and strategies for safe use of new biomolecules and bioprocesses, for identifying recombinant organisms and their residues in the environment and assessing their impact on human and animal health, to support Community policies					x	
	3.3 New biological and biotechnological products and processes for agro-industry, agri-food and high value added chemicals	3.3.1 Exploiting the cellular and molecular characteristics of organisms				x		x
		3.3.2 High value-added products and processes involving/derived from microbes, plants and animals					x	
		3.3.3 Functional biomolecules and biocatalysts					x	
		3.3.4 Identification and sustainable use of metabolic and genetic diversity as a source of valuable products						x
4. Environment and Health	4.1 Diseases and allergies related to the environment		31	-	43	x		x
	4.2 Assessment and reduction of environmental health hazards					x		x
5. Sustainable agriculture, fisheries and forestry and integrated development of rural areas, including mountain areas	5.2 The integrated production and exploitation of biological materials for non-food uses		40	76	16	x		x Targetted research aspects only across all Action Lines in KA5
	5.3 Sustainable and multipurpose utilization of forest resources					x		
	5.4 Support for common policies	5.4.1 Community agriculture and the international context				x		
		5.4.2 CAP measures and related activities including socio-economic aspects						
	5.1 New and sustainable systems of production, including breeding methods in agriculture, fisheries and aquaculture						x	
	5.4 Support for common policies	5.4.3 Monitoring and enforcement of the CFP					x	
		5.4.4 Social and economic basis of the CFP						
	5.5 New tools and models for the integrated and sustainable development of rural and other relevant areas						x	
6. The ageing population	6.1/6.2/6.3/6.4/6.5 Age-related illnesses and health problems; determinants of healthy ageing; demography and epidemiology of ageing; coping with functional limitations in old age; health and social care services to older people		41	-	47	x		x
RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES OF A GENERIC NATURE			-	118	-		x	
Indicative budget in millions of per deadline: to be established in due time by the budgetary authority.			*192*	*316*	*215*			

Annex III: Coordination

In conformity with the new strategy of problem-driven research, materialised in particular through the key actions, it is a deliberate move that EU research aligned with the objectives of any key action should benefit to any possible extent from the contributions of third country participants and international organisations where appropriate, from the whole fabric of innovative SMEs as value-providers, and from a high turn-over of competent and versatile human resources. A full integration will be sought through the same projects, with common mechanisms of coordination, and the possible support of accompanying measures as facilitating options. The calls for proposals will also specify the need for socio-economic research and technology impact assessment, as an integral part of all key actions.

1. Confirming the international role of Community research

This programme will be open to participation by researchers from outside the EU and Associated States according tot he rules of participation set out in the Decision persuant to article 130J of the treaty, thus complementing the activities of the horizontal programme 'Confirming the International Role of Community Research'. Global international cooperation will be encouraged for RTD activities which deserve being tackled in a broader transboundary context, and in the first place where cooperation agreements exist or where synergies with other international programmes and activities can be exploited for the benefit of Europe. Particular attention would go into opportunities for cost-effective coordination and cooperation with initiatives such as COST or EUREKA, where complementary activities are taking place.

Considering the role of management supporting party of the Commission in the Human Frontier Science Programme, cross participation and coordination with this programme on specific action lines in the present work programme will be stimulated through a contribution during the whole duration of the 5th Framework Programme. This contribution will be made available through yearly subsidies.

The programme 'Confirming the International Role of Community Research' provides funding for bursaries to young scientists from Developing Countries (including Emerging Economies and Mediterranean partner Countries) to come to Europe to work in projects of this programme for a period of up to 6 months.

2. Innovation and participation of SME

Innovation

One of the general objectives of the horizontal programme 'Promotion of innovation and encouragement of SMEs participation' is to improve the economic and social impact of framework programme research activities by ensuring better dissemination of technology from various sources, taking account of the needs of customers and users.

In order to achieve this objective the horizontal programme, inter alia, will coordinate and support the efforts of the thematic programmes which themsevles, under the impulse of their innovation cells, will carry out the bulk of the work related to the promotion of innovation. As such, account will be taken of the specific features of the research topics and the best possible match between the exploitation of research and their application context will be ensured. In this context the programme 'Quality of life and management of living resources' will devote particular attention to the aspects dealing with the exploitation of results and innovation during the evaluation of proposals and during the negotiation of contracts (part of the technical annex dealing with dissemination and exploitation of results, implementation and follow up of the Technology Implementation Plan). The programme "Quality of Life and Management of Living Resources" will promote, where applicable, private financing of the exploitation of RTD results, optimisation of technology transfer, including outside the consortium (i.e. industrial platforms, extended audiences), and promote an innovation and entrepreneur culture (i.e. sensibilization, case-studies, training).

SME Specific Measures

The programme will implement special measures to facilitate and encourage the participation of SMEs in RTD, demonstration, combined and innovation projects that show great potential as regards innovation. These measures consist of Cooperative Research (CRAFT) and Exploratory Awards

An Exploratory Award is intended to prepare a complete project proposal: either a CRAFT project proposal that is submitted in response to the open call, or an RTD, demonstration, combined or innovation projects submitted in response to a periodic call.

The measures aimed at encouraging and facilitating SME participation in RTD activities relate to projects that show great potential as regards innovation. Cooperative Research proposals and Exploratory Awards proposals aimed at Cooperative Research may fall within the overall objectives of the thematic programmes. In other words, they do not have to relate to the specific objectives and priorities of the key actions, generic technologies and research infrastructure. As such, these measures allow for a "bottom up" character since proposals may be submitted for the objectives and priorities of the thematic programmes in their entirety.

Exploratory Award proposals intended to prepare non-CRAFT projects must address priorities identified in the work programme regarding the periodic call envisaged for the submission of the resulting project proposals. In addition, they must be submitted sufficiently in advance of the closing date of the envisaged periodic call (i.e. at least 9 months between the chosen cut-off date for the submission of the Exploratory Award proposal and the closing date of the periodic call). Non-CRAFT project proposals prepared through Exploratory Awards must conform to the priorities of the periodic call in response to which they are submitted (even if these priorities have changed compared to those on the base of which the Exploratory Award proposals were selected).

The implementation of the SME specific measures follows the common rules established in the horizontal programme "Innovation and the participation of SMEs", in order to ensure transparency for the beneficiaries. These rules include common contractual and proposal evaluation, a single complementary entry point for the reception of proposals for SME specific measures, common rules for eligibility and for scientific and technological evaluation; common legal and financial provisions as well as a harmonised and rapid feedback to applicants.

- "Cooperative Research" proposals (CRAFT) enable at least three mutually independent SMEs from at least two different Member States or one Member State and an Associated State to jointly seek the resolution of their common technological problems by entrusting it to third legal entities (the "RTD performers"), including industrial entities, with appropriate research or technological validation capacities. In the context of Cooperative Research projects, it is allowed that those SME contractors which are able to carry out part of the research themselves may do so up to 60% of total project costs, leaving the remainder (40% or more) to be executed by the RTD performer. The total cost of Cooperative Research projects may not exceed 2 million EURO, of which the Commission may fund up to 50%. Their maximum duration is 24 months. Cooperative Research projects might include a validation phase.
- "Exploratory Awards" allow at least 2 SMEs from 2 different Member States or one Member State and an Associated State to obtain financial support from the Commission to prepare a complete project proposal. The total cost of an Exploratory Award may not exceed 30.000 EURO, of which the Commission may finance up to 75% (or 22.500 EURO). The maximum duration of an Exploratory Award is 12 months.

3. Improving human potential

Marie Curie Training Fellowships are defined in the framework of the horizontal programme "Improving the human research potential and the socio-economic knowledge base". The "Quality of Life and Management of Living Resources" programme will offer the following types of Marie Curie Fellowships: Individual Fellowships; Return Fellowships; Experienced Researchers Fellowships; Industry-Host Fellowships; (PhD stays at) Marie Curie Training Sites.

The implementation of the Marie Curie Fellowships follows the common rules established in the horizontal programme "Improving the human research potential and the socio-economic knowledge base", in order to ensure the consistent high quality and prestige of the schemes. These rules include a common definition of Marie Curie Fellowships, a Single Entry Point for the reception of all Marie

Curie Fellowship proposals, common rules for eligibility and for evaluation, common legal and financial provisions as well as a harmonised feedback to applicants and monitoring of the fellows.

Research Infrastructures

Support for research infrastructure is provided by thematic programmes, as well as by the horizontal programme "Improving the human research potential and the socio-economic knowledge base". This horizontal programme will have the responsibility of drawing up and publishing on a regular basis a "map" showing for all classes of research infrastructure to which specific programme(s) they may apply for support.

Socio-economic Research

Socio-economic research can be funded by both the thematic programmes, as well as by the key-action on "Improving the Socio-economic Knowledge Base" of the horizontal programme "Improving the human research potential and the socio-economic knowledge base". Taking into account the philosophy of the Fifth Framework programme, socio-economic research is present in the thematic programmes as an integral part of the technological research activities. Specific measures will be taken by the horizontal programme to ensure co-ordination of the socio-economic research to be implemented within the current programme. The horizontal programme will draw up an annual report on socio-economic research in the Fifth Framework Programme.

4. Interactions within the programme and across programmes

How far can this programme meet citizens expectations will depend on the possibility to maintain, or even multiply the number of interfaces. The whole set-up of the programme is already based on the recognition and upgrading of technology cross-roads. Each key action indeed does already combine biological knowledge and sets of converging technologies. And yet, more such interactions can be anticipated within the programme and across sister programmes, including horizontal activities. This is illustrated through Tables 1 and 2.

There is a degree of unpredictability in trying to define the extent of possible interfaces such as in the tables. It should be enough to recall the following principles, when reviewing in-coming proposals:

- It is assumed that proposals, drafted as they should in accordance with the RTD priorities enumerated in the previous part of the workprogramme, should unambiguously fall under the relevant actions and be coordinated, where appropriate, with other projects of the same action.

- In case a proposal is trangressing academic frontiers and includes either remote technology inputs or multiple spin-offs in neighbouring fields, its submission through the "Quality of Life and Management of Living Resources" programme would still be legitimate. It would be sufficient that the core of such proposal be relevant to the RTD priorities seen above.

- As a guideline, a proposal which essentially intends to **develop** a new technology should seek funding from the programme which is the natural host for such technology (e.g. genetics comes under theme 1, computer science under theme 2, instrumentation and process design under theme 3, ecology under theme 4, etc.). Conversely, a proposal which **uses** or **streamlines** a technology developed elsewhere to reinforce performance in research and applications with the quality of life and management of living resources as a **primary objective**, should be addressed to this programme known as theme 1.

The handling of this type of projects would imply that they be examined in the proposal stage simultaneously by the management teams of the two (or more) programmes covering the connected interests, and be further coordinated with a wider range of sister projects across the programmes in the implementation phase. Clustering mechanisms could support this process.

Tables relating to Annex III, Point 4 (Coordination)

Please note:

These tables are intended to enable the reader to identify in the main text possible interfaces between the key actions in the thematic programme Quality of Life, and areas of possible relevance in other programmes (accessible via the DG Research website http://wwwcordis.lu/lif.e).

Each interface in Table I is described in two cells, referring to numbered headings in the work programme text of the key actions which label the rows.

In Table 2, interfaces are referenced only to the texts of the other work programmes (column headings).

TABLE 1: INTERFACES BETWEEN THE KEY ACTIONS OF THE SPECIFIC PROGRAMME « QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES »

	FOOD, NUTRITION AND HEALTH (K.A. N°1)	CONTROL OF INFECTIOUS DISEASES (K.A. N°2)	THE «CELL FACTORY» (K.A. N°3)	ENVIRONMENT AND HEALTH (K.A. N°4)	SUSTAINABLE AGRICULTURE, FISHERIES, AND FORESTRY [...] (K.A. N°5)	THE AGEING POPULATION AND DISABILITIES (K.A. N°6)
FOOD, NUTRITION AND HEALTH (K.A. N°1)		Detection and elimination of infectious and toxic agents throughout the food chain (1.2) inc. TSE, food pathogens	Safe and flexible manufacturing processes and technologies (1.1) inc. novel and improved biological raw materials for food	Detection and elimination of infectious and toxic agents in food chain (1.2) inc. food borne hazards	- Detection and elimination of [adverse] agents in food chain (1.2); - Safe and flexible […] processes and technologies (1.1) incl. quality monitoring and traceability	Role of food in promoting and sustaining health (1.3) inc. particular needs of older persons
CONTROL OF INFECTIOUS DISEASES (K.A. N°2)	- Development of improved or novel […]vaccines (2.1) inc. food animals; - Strategies to identify and control infectious diseases (2.2) inc. risk of transmission		- Development of improved or novel […] vaccines (2.1); - Strategies to identify and control infectious diseases (2.2)	- Development of improved or novel […] vaccines (2.1) inc. wildlife vaccination; - Strategies to identify and control infectious diseases (2.2) inc. risk of transmission	*All three action lines in Key Action N°2 as related to* infectious diseases in animals	Development of improved or novel mono-component, multi-component and combined vaccines (2.1) inc. immunisation strategies for older persons
THE «CELL FACTORY» (K.A. N°3)	- New and innovative health-related processes and products (3.1); - New bio(techno)logical processes/products (3.3)	New and innovative health-related processes and products (3.1) inc. vaccine production, therapeutics and diagnostics		- Energy-efficient bioremediation and waste biotreatment processes (3.2) inc. devices, biosensors, monitoring GMOs and measurement of pollution	New biological processes and products from cell factories (3.3) inc. products and processes derived from plants and farm animal	New and innovative health-related processes and products (3.1)
ENVIRONMENT AND HEALTH (K.A. N°4)	- Diseases and allergies related to […] the environment …(4.1); - Diagnosis, risk assessment, […] env'tl health effects (4.2)	Diseases and allergies related to or influenced by the environment, their prevention and treatment (4.1)	- Diseases and allergies related to […] the environment, … (4.1); - Diagnosis, risk assessment and management processes … (4.2)			Diseases and allergies related to or influenced by the environment …(4.1) inc. special needs of high-risk groups
SUSTAINABLE AGRICULTURE, FISHERIES, AND FORESTRY, [...] (K.A. N°5)	New and improved systems of production and exploitation in agriculture, fisheries and aquaculture (5.1) inc. quality policy	New and improved systems of production and exploitation in agriculture, fisheries and aquaculture (5.1) inc. animal health and welfare	- New and improved systems … (5.1) inc. breeding techn., GMOs; - The integrated production […] for non-food use (5.2); - Sustainable and multi-purpose […] the integrated forestry-wood chain (5.3)			
THE AGEING POPULATION AND DISABILITIES (K.A. N°6)	Demography and epidemiology of ageing (6.3) inc. lifestyle determinants	Age-related illnesses and health problems (6.1)	Determinants of healthy ageing (6.2) inc.cellular and molecular mechanisms of ageing	Demography and epidemiology of ageing (6.3) inc. environmental determinants		

TABLE 2/1: INTERFACES BETWEEN THE KEY ACTIONS OF THE SPECIFIC PROGRAMME « QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES » AND THE OTHER THREE THEMATIC PROGRAMMES

	THE USER-FRIENDLY INFORMATION SOCIETY		PROMOTING COMPETITIVE AND SUSTAINABLE GROWTH		ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT
FOOD, NUTRITION AND HEALTH (K.A. N°1)	Systems and services for the citizen (3.2):	- Personal health systems inc.supporting health status at home, work and leisure	Generic Activities (3): - Materials and their technology for production and transformation (3.1) inc. new and improved materials for food, health and other sectors (eg advanced functional materials for implants and invasive devices); - Measurements and testing (3.3) inc.technical support to standardisation and Community policies and to the development of certified material		Sustainable city planing and […] management (4.1) inc. safety and availability of essential supplies
CONTROL OF INFECTIOUS DISEASES (K.A. N°2)		- Health inc. systems for health professionals			Treatment and purification technologies (1.3) inc. infectious contaminants in water
THE «CELL FACTORY» (K.A. N°3)		- Personal health systems inc. dev't. of advanced biosensors, transducers and microsystems		Innovative products, processes and organisation (2.1) inc. eco-efficient design and technol.; new and miniaturised products and processes	- Treatment and purification technologies (1.3) inc. novel biotechnologies; - Pollution prevention (1.4) inc. novel bioremediation and bio-sensors - Assessing […] biodiversity (2.2.3)
ENVIRONMENT AND HEALTH (K.A. N°4)		- Intelligent environmental monitoring and management			- Treatment and purification technologies (1.3) inc. drinking water; - Understand […] predict global change processes (2.1) inc. scenarios of risks to human health - Sustainable city planing […] and management (4.1) inc. optimising urban environmental quality; - Research and technological development activities of a generic nature: radiation protection and health
SUSTAINABLE AGRICULTURE, FISHERIES, AND FORESTRY, ... (K.A. N°5)		- Intelligent environmental monitoring and management		- Eco-efficient processes and design (1.3); - Materials and their technologies for production and transformation (3.1) inc. sustainable chemistry	- Treatment […] technologies (1.3) inc wastewater re-use; - Pollution prevention (1.4) inc. combating diffuse pollution; - Surveillance, […] and communication systems (1.5) inc. management and control systems; - Regulation of stocks …(1.6) inc. technol. and manag. tools; - Scenarios and strategies for responding to global issues (2.3) inc. reconciling conservation of biodiversity with farming, forestry and land use changes; - Reducing anthropogenic impact […] on marine ecosytems and biodiversity (3.2)
THE AGEING POPULATION AND DISABILITIES (K.A. N°6)		- Persons with special needs inc. persons with disabilities and older persons		- Innovative products, processes and organisation (2.1) - Sustainable mobility and intermodality (2.2)	
	Cross-programme themes (3.1): Design for all for an inclusive information society (CPA3)				

TABLE 2/2 : INTERFACES BETWEEN THE ACTIONS OF THE SPECIFIC PROGRAMME « QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES » AND THE HORIZONTAL PROGRAMMES AND THE JOINT RESEARCH CENTRE PROGRAMME

	CONFIRMING THE INTERNATIONAL ROLE OF COMMUNITY RESEARCH		INNOVATION AND PARTICIPATION OF SMEs	HUMAN RESEARCH POTENTIAL AND THE SOCIO-ECONOMIC KNOWLEDGE BASE	JOINT RESEARCH CENTRE
FOOD, NUTRITION AND HEALTH (K.A. N°1)		Excluding activities in section A1, which are specifically dedicated to the pre-accession countries, all areas of the programme interface with the thematic programmes in view of stimulating participation of third countries, through research and training, and co-ordinating research-related activities undertaken by the EU at the international level	Coordination and support activities relating to Innovation and Small and Medium Enterprises participation (IV-A and IV-B)	- Support for training and mobility of researchers, through research training networks and Marie Curie fellowships (complementing those within the "QOL" programme); - Enhancing access to research infrastructures, through cooperation networks and RTD projects ; - Promoting S&T excellence, through conferences, distinctions and public awareness activities; - Improving the socio-economic knowledge base, including coordination and support of socio-economic research activities of thematic programmes ; - Support for the development of S&T policies, through strategic analysis of specific political issues, and establishing a common basis of S, T & Innovation Indicators.	"The mission of JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of Community policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Community. Close to the policy-making process, it serves the common interest of the Member States, while being independent of commercial or national interests. Carrying out specific high-level research in close contact with industry and other bodies, the JRC supports the policy maker in addressing the concerns of the individual citizen, improving the interaction between man and the environment and promoting sustainable development. In implementing its mission, the JRC will endeavour to coordinate RTD activities carried out in the Member States. Its work depends upon intensive networking with public and private institutions in the Member States through, for example, research networks, joint projects or staff exchanges. This is important because the JRC's mission is complementary to the indirect action part of the Fifth Framework Programme; while the indirect actions will continue to be the main machanism for developing and testing new ideas, the JRC's role is to help apply them in the service of the policy maker." (Annex II to Council Decisions on JRC specific programmes) Therefore the JRC focuses its RTD projects at the interface of science and technology with Community policies. For more information on the JRC Work Programme, please vitsit the JRC home page at http://www.jrc.org.
CONTROL OF INFECTIOUS DISEASES (K.A. N°2)	Co-operation with third countries(A): - Improving health care in a changing society (A.2b); - Promoting healthy societies (A.3d); - Tools for sustainable development (A.4b)				
THE «CELL FACTORY» (K.A. N°3)	Co-operation with third countries(A): - Environment and industry, problems of selected regions and sectors (A2a) inc. biotreatment and recycling, environmentally benign technologies; - Tools for sustainable development (A4b) inc. plant and animal production technologies (eg breeding, biological nitrogen fixation)				
ENVIRONMENT AND HEALTH (K.A. N°4)					
SUSTAINABLE AGRICULTURE, FISHERIES, AND FORESTRY, ... (K.A. N°5)					
THE AGEING POPULATION AND DISABILITIES (K.A. N°6)					