MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

Outline of the approach of the Czech Republic to the preparation of the 8th Framework Programme of the European Community for Research, Technological Development and Demonstration Activities

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INTRODUCTION

The Czech Republic started discussions on the future shape of FP 8 in July 2010. More than 100 experts have been working in 13 thematic groups. As a result of this work a document of about 190 pages was drafted with chapters containing an evaluation of the Czech participation in FP 6 and FP 7 in different thematic areas, possible synergies with structural funds, national RnD programmes and European activities. This document will be further edited. A short version of the document is now presented to the European Commission as the Czech contribution to the call of the European Commission to formulate questions for the coming public discussion on FP 8 planned for March to June next year.

GENERAL FOCUS OF THE 8TH FRAMEWORK PROGRAMME IN THE CONTEXT OF CURRENT CHALLENGES

Since the start, the building of a common European house for research has been going in two directions. The first lines of activities were activities leading to the coordination of national policies and resources for research. One of the main tools used to pursue this goal was the Open Method of Coordination work done by CREST and later the drafting of the National Reform Programmes, aiming to meet the target of the Lisbon Strategy. The other direction was the gradual establishment of a common instrument for financing research from the European level, the Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (hereafter the Framework Programme, FP). The first framework programme was launched in 1984. The Czech Republic has taken part in the framework programmes since the 3rd FP.

The topics of the framework programmes reflected the challenges and changes in the society and the situation of the European Union as a whole. The 6th FP was focused entirely on the construction of the European Research Area, as was the 7th FP. The increase of the budget of the 6th FP after the joining of the new member countries from €17.5 billion to €19.235 billion[1] is an evidence of the

[1] Claus Madsen: Scientific Europe – Policies and Politics of the European Research Area

flexibility of the European Union in reacting to the changes of the needs of the Community.

The following graph (fig. 1) illustrates that the budget of the framework programmes has been constantly rising[2]. This growth clearly shows that the Member States of the European Union have confidence in the influence of research and development on the competitiveness of Europe.

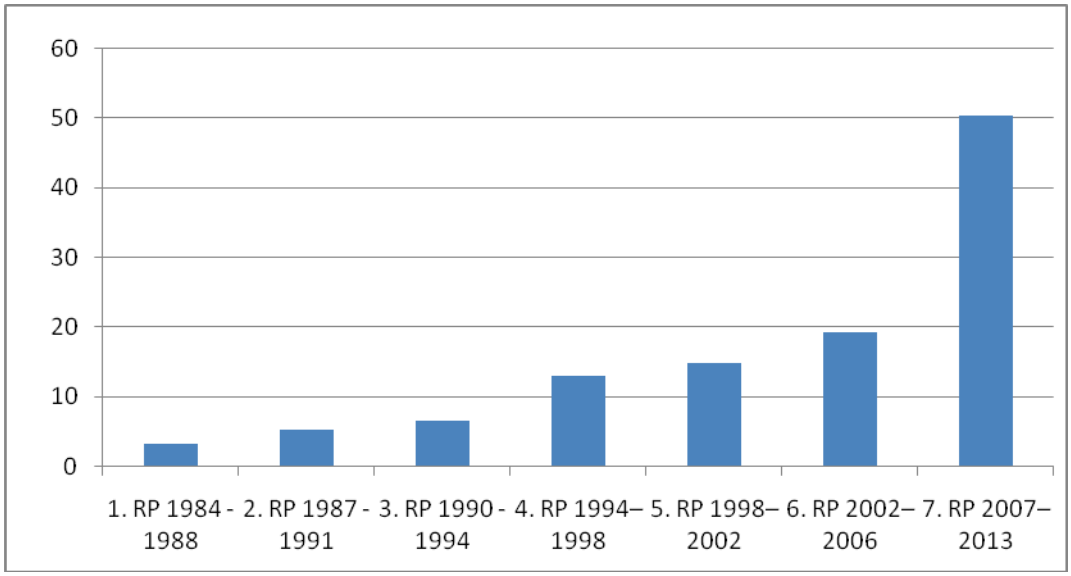

Fig. 1 Budgets of the framework programmes

What will then influence the future of FP8? The ongoing economic crisis shows the **need of a better application of the results of research for innovation and industrial use**. The focus on innovation and cooperation with industry will certainly be a priority. Already during the 7th FP, the importance of a stronger link between the selection of research topics and the **needs of the society** was pointed out. A part of the new framework programme should probably complement the instrument for the coordination of national policies and resources in selected **joint programming** themes, reflecting the challenges of the current society. Such approach would link together the efforts of coordinating national policies and financing research from the European level and would result in a new kind of approach to European integration. The ongoing economic crisis also raises the question whether it would be possible to finance the **operational**

[2] Budgets of the framework programmes – y axis, millions of €: 1st FP €3,750; 2nd FP €5,396; 3rd FP €6,600; 4th FP €13,120; 5th FP €14,960; 6th FP €19,235; 7th FP €50,521; source – presentation of the EC Towards the Seventh Framework Programme (2007–2013); Decision of the European Parliament and the Council no. 1982/2006/ES from 18 December 2006 concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007–2013)

costs and/or **open access** to large research infrastructures which would be considered "European," from the framework programme. The framework programme should not overlook the fact that high-quality innovation and **progress of the society is not possible without high-quality fundamental research**. The new framework programme should probably also reflect the changes in the Treaty on the Functioning of the European Union and consider the possibility of strengthening the **space theme in the framework programme** or consider the creation of a separate space programme.

In the following chapters, we will focus on determining the priorities and recommendations of the Czech Republic for the 8th Framework Programme of the European Community for Research, Technological Development and Demonstration Activities. At the end of each chapter, there is a list of questions the Czech Republic recommends for the European-level public discussion during the first half of 2011.

General questions:

- How and to what extent will the priorities of FP 8 be coordinated with the Joint programming and European Innovation Partnerships (EIPs)?
- Joint programming and EIPs should be European endeavours. Does the EC envisage entering as partner into these activities in order to provide access for researchers from countries not participating in a specific theme or specific ETP?[3]
- Are there any particular measures that will assure synergies of CIP, FP8 and SF?
- How to preserve and evaluate impact of previous Framework Programmes?
- How to optimize the educational programmes with regard to the needs of Knowledge Triangle?
- How will the EU deal with the theme space? Should not be the theme space in FP8 more oriented to space research in coordination with the ESA activities oriented more into development? Who will be responsible for the policy? Who will implement it?
- Should not the EU balance the basic and applied research contributions? Should not the budget of the ERC like instruments be raised?
- Should not any additional systemic support for activities related to the successfully completed FP7 and FP8 projects be provided?

[3] Small countries will not be able to enter into all themes.

- How to best deal with the synergies between SFs and FP having in mind specific orientation of SF towards cohesion and FP towards excellence?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF HEALTH

Chronic childhood diseases – declining birth rate and growing number of children with chronic or long-term illnesses (e.g. diabetes, autoimmune disease, epilepsy, genetically determined disease, polygenic serious childhood diseases, including cancer, chronic respiratory diseases, incl. bronchial asthma) is the problem across the EU. The integration of pediatric patients after previous long-term treatment of severe chronic disease in society, including the specifics of health care for former chronic patients among children must get the attention both from pediatricians and especially general practitioners for adults, as well as other specialties in the field of medicine for adults. In the Czech Republic, the issue is studied in a number of sites (e.g. Charles University, 2nd Medical School, Motol University Hospital, Faculty of Medicine Hradec Králové, Masaryk University Hospital Brno, Palacký University - University Hospital in Olomouc.

Personalized medicine with focus on seniors and children

The issue of personalized medicine is in the last time at the forefront of the biomedical professional public. The reason is that in many cases the long-term treatment of chronic diseases leads to situation, in which the usual standard diagnostic or therapeutic procedures in particular, do not sufficiently respect an individual's specific profile. Thus, such phenomena can then be inadequate treatment, respectively the non- treatment on one side and disproportionate, complications caused by treatment of on the other side. Generally it is considered as necessary to diagnose the right therapy to the patient at the right time. The question of personalized medicine is an intersection of a multidisciplinary problem, reflected in the medical specialties, which uses long-term therapy for chronic diseases - mental, neurological or oncology. In the Czech Republic, the issue is studied in a number of institutions (Charles University, First Faculty of Medicine, University, Psychiatric Centre, Masaryk Memorial Cancer Institute)

Neuroscience – the incidence of neurological diseases in recent years significantly increases and can predict their dramatic and sustained increase in the upcoming years. The reasons are following: the aging of population in developed countries, gradually improving health and social care, including increasing access to health care, increasing awareness of the laic public about neurological diseases and treatments. We can assume a huge increase in particular in the incidence of stroke with resulting long-term movement disorders that will significantly burden the spending in health care and in social area and will certainly have global economic implications. Another group, which is worth of

attention, is a group concerned with dementia and other neurodegenerative diseases (such as Parkinson's disease, dystonia, essential tremor); from other diseases then multiple sclerosis, epilepsy, nervous system trauma or neuropathy. Another issue in the field of neuroscience is the topic of disseminated sclerosis and in the relation to the age also the Alzeimer´s disease, the question of connecting adequate pharmacotherapy – personalized medicine with focus on seniors.

In general, patients with impaired mobility and cognition are significantly influenced by the quality of life, employment, family life and interpersonal relationships. Scientific discoveries and medical prevention procedures, early diagnosis (e.g. searching for specific markers) and in case of development of specific diseases and the rational search for treatments are an open challenge for researchers, neuroscientists, and for clinicians. The issue of neuroscience is studied on medical faculties of Charles University, Masaryk University, Palacky University and in the workplaces IKEM and Academy of Sciences.

Metabolic syndrome and obesity - a major risk civilization factor for the development of other chronic diseases. Obesity is the most common metabolic disease that does not afflict only adults, but increasingly also children. In the Czech republic in 2000 was obesity found in 6 % of boys and 5.6 % of girls at the age 7-11 years. The incidence of obesity is increasing in population every 10 years by 10-40 %. The incidence of obesity by children nearly tripled over the past 10-25 years. Most obese children remain obese also in adulthood. A significant proportion of genetic factors on the development of obesity and metabolic syndrome and their relationship indicates common pathogenesis of these two states, which represent risk for the individual in terms of morbidity and mortality. Obesity is now a serious multisystem disease that occurs to children, even at the preschool age. Negative external factors contributing to obesity and symptoms of insulin resistance are known, it is necessary to study these factors and conditions that preclude early implementation of adequate preventive measures, which can make a significant improvement and extension of one´s life in adulthood. Factors affecting the development of obesity and metabolic syndrome should be studied both in the general population and in different risk groups such as children with various chronic diseases. This issue is studied in the CR on the medical faculties of Charles University, Masaryk University and Palacky University.

Cardiology: In the field of cardiology, prevention must clearly dominate, which means to influence the behavior of parents towards children: alimentation habits, adequate physical activity, drug addiction – smoking, alcohol, drugs. Another area of this program is the prevention in adult´s age: again alimentation habits, exercise, prohibition of smoking, and sufficient dispensary care with the adequate intervention activity. Another group of activities in cardiology should focus on prevention of atrial fibrillation, which is becoming an epidemic of 21st century. It is necessary to focus on genetic predisposition, precipitating factors

and prevention of complications. An equally important aspect in cardiology is the care of patients with the end stage of cardiovascular diseases – the palliative care. Sufficient conditions for the care of these patients have not yet been developed. As far as the Czech Republic should be involved, except LF MU Brno, also 1st to 3rd Faculty of Medicine, Experimental Medicine, Prague, Motol Hospital, Charles University Hradec Kralove, and Plzen, and Palacky University in Olomouc.

Traumatology: Multiple trauma and sepsis are currently the most common causes of death of patients in intensive care units in developed countries. These diseases often progress to multiple organ failure syndrome and represent a substantial portion of the treatment costs. The problem, which remains, is the high mortality and the following morbidity, which further dramatically increases the treatment costs. It is evident, and the current direction of research confirms it, that only support of the research, which early diagnoses these states and promotion of research of effective treatment of organ dysfunction, could reduce the mortality of multiple trauma and septic conditions, shorten hospital stay in intensive care and reduce subsequent morbidity in these patients. This issue should be comprehensively studied with connection to surgery, intensive care, microbiology and rehabilitation medicine

Research on stem cells and their potential clinical use:

Field of regenerative medicine, cell therapy and histic engineering are the fastest growing branch of science. The aging of the population associated with the occurrence of degenerative diseases and the increasing frequency of injuries associated with e.g. traffic, increases the emphasis on regenerative medicine research related to stem cells. This area includes in particular the expansion of stem cells in vitro in relation to microambience and differentiation. It is necessary to develop procedures and technologies that will help in the treatment of so far incurable diseases and injuries. For example, the brain and spinal cord injuries, Parkinson's disease, multiple sclerosis, diabetes, diabetic foot treatment or a bone graft to help such patients after trauma or tumor. The parallel between normal and tumor stem cells can lead to a better understanding of normal stem cells. Stem cells of adult organism, embryonic, fetal and genetically modified cells are the great hope for many patients. Research in the future has the potential to allow treatment or significantly improve the health status of patients, whose current treatment results only in a suspension of illness, or is unable to influence it at all. In the Czech Republic, the issue is studied mainly in the 1st and 2nd Faculty of Medicine, Academy of Sciences of CR, and the Institute of Molecular Genetics Academy of Sciences and the Masaryk University in Brno.

Questions:

- ◎ Some topics in various calls under the Theme Health of the FP7 Cooperation SP seem to be so narrow, and exactly specified that one may speculate about the role of lobbying of certain laboratories in preparing tailored work programmes. Should not be the topics of particular calls (not only under the theme Health) slightly more wide-ranging and thus less prone to an excessive lobbying?
- ◎ Should not the medicine be personalized, especially when dealing with children and elderly patients?
- ◎ The neurodegenerative diseases are a very broad category, and their occurrence will rise in the coming years. Should not the FP 8 complement the joint programming initiative in this field by funding areas, which will not be covered by the JP initiative?
- ◎ Should not the FP8 also take into account the need for palliative medicine for cardiovascular disease patients in the terminal stages?
- ◎ Should not the FP 8 investigate more closely the prevention of polytraumatic and septic states?
- ◎ Should not the stem cells research be more funded under the FP 8?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF POPULATION AGING

1. **The biological basis of aging, aging prevention, prolonging human lifespan**
2. Changes in the nervous system related to aging, neurodegenerative diseases, Alzheimer disease, early diagnosis of dementia symptoms, treatment
3. **Age-related changes in the locomotor system of the human body, preventing old-age changes of the locomotor system, treatment**
4. Sensory changes caused by aging, loss of hearing and sight, prevention, treatment
5. The development of joint and bone prosthetics, optimal environment for old-age mobility, hearing and sight aids, development of specialised technology for the elderly
6. Finding optimum care for the elderly, individual care, institutional care, safe homes

7. Demographic changes in the society, society changes and the future of the aging population, the consequences of demographic changes on the life in Europe
8. Age discrimination, the "ageism" issue (see the investigation of the European Social Survey)
9. **Optimising healthcare of the aging population, safe pharmacotherapy, institutional and community care, palliative medicine**
10. **Aging and public healthcare, programmes for maintaining physical and mental faculties in old age, psychology of the aging population, cross-generational relationships**

The following three areas are considered of special importance by the Czech Republic: **1, 3 and the combination of 9 and 10.** These should be considered a priority in the discussions of the research topics of the 8th Framework programme.

QUESTIONS CONCERNING THE THEME AGEING POPULATION:

- The Czech Republic considers the theme ageing population of such an importance, that we would like to have it as one theme of a Specific programme (e.g. Cooperation). Would this be in line with the current trend in research?
- Should not the research be directed in the prevention area especially to the prolonging the mobility of the ageing population?
- The approach to the ageing population should be covering all aspects of this process. Should not the FP 8 take a holistic approach to the process of ageing?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF ENERGY

1. The highest priority is the **research of sustainable nuclear energy**. This research should focus particularly on the development of **Generation IV reactors**, capable of processing long-term radioactive waste created during fission in current reactors. The research should also include special components for high temperature gas or fluid metal cooled reactors with integrated gas turbines and exchanger systems for the production of hydrogen as a clean fuel.

2. In nuclear energy, another high priority is development aimed towards a higher **safety of the current generation of reactors and their greater efficiency and lifespan**, together with perfecting the means of **handling nuclear fuel and waste** and storing waste in short-term and long-term repositories.

3. The development of the **use of alternative energy sources**, in particular the efficient use of water, wind and geothermal energy, biomass and solar energy, the energy use of recycled materials, and also the development of facilities suitable for the use of distributed energy systems, with the use of local conditions and primary energy resources.

4. **The development of networks (Smart Grids) and system integration** that will enable highly efficient use of generated energy. In addition to this, Smart Grids as means for Smart cities including the integration of local resources and consumers. Into local and global energy networks (electricity, heating, cooling), including the accumulation of energy.

5. Solving problems related to the **accumulation of energy**, especially in context with the unstable types of alternative energy resources(wind, solar energy).

6. Seeking the possibilities of **saving energy** in generation, transfer and consumption. The development of software tools for efficient consumption and limiting energy losses during transfer by developing special materials decreasing transfer loss.

7. **The development of clean carbon technologies**, suitable for use in traditional power plants.

8. **Special attention must be given to nuclear fusion.**

With the approval of the construction of the **ITER** experiment, the forming of a satellite programme and the prepared founding of the EFDA (European Fusion Development Agreement) department of the physics and technology of fusion power plants with the goal to create a concept study of a fusion power plant and prepare the further step, DEMO, European fusion research is starting to take shape. The SET Plan (Strategic Energy Technology Plan) considers fusion energy "a promising energy source for the long-term horizon". Even though the commercial use of fusion can be expected at earliest at the turn of this century, right now is the time of the development of key technologies and new materials. This is why the Czech Republic's participation in this programme is essential. In all of those areas, the CR can make a substantial contribution to the European programme – by supplying equipment and materials for the construction of ITER (Ateko, Škoda Jaderná energetika, ČKD Energetika…), new physics knowledge (the COMPASS tokamak), developing fusion materials (the Institute of Plasma Physics – UFP, the Institute of the Physics of Materials – UFM, the Nuclear Research Institute – UJV Řež, …) and also the education of a new generation of

professionals (e.g. at the COMPASS tokamak, in collaboration with the Faculty of Mathematics and Physics of the Charles University and particularly the Czech Technical University's Faculty of Nuclear Sciences and Physical Engineering, where the new "Physics and technology of thermonuclear fusion" study programme has opened recently).

9. Preparing the construction of the **HiPER** fusion reactor, with ongoing participation of the Czech Republic in the preparatory phase.

QUESTIONS:

- Should not the FP 8 priorities in the field of nuclear fission be directed to the need of prolonging the life cycle and effectivity of reactors, the development of reactors generation IV. And development of reactors with a lower need of nuclear fuel?
- The balance between the traditional and new ecological productions of energy should be maintained. Should not the FP 8 investigate more the clean coal technologies?
- Should not the FP 8 consider supporting both ways of fusion energy production represented by ITER and HiPER projects?
- How the SET-Plan priorities (demonstration projects and required associated R&D) will be reflected into conceptual framework of FP8?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF AGRICULTURE, ENVIRONMENT, CULTURAL HERITAGE AND ENVIRONMENTAL EARTH OBSERVATION

AGRICULTURE

In general, support is given to new methods and processes securing adequate production of high-quality, safe food and water as well as mitigating the effects of climate change.

Specifically supported areas:

– Research, diagnostic procedures and prevention of the spread of disease carriers and plant pests

– Infectious diseases of livestock, health prevention, animal welfare

– Energy use of biomass, by products and other agricultural production waste

– Research in the field of animal and plant biotechnology, research of the functions of genes, gene resources; use of farm animals and plants for the production of recombinant proteins

– Sustainability and quality of life in rural areas, creating new jobs

– Water resources and their non-agricultural use, landscape planning

FOOD AND THE FOOD CYCLE

Main research areas:

food for a healthy diet

- Development of new types of foods and food supplements with a declared health benefit
- Development of dietetic food and food for consumers with various disorders
- Studying the possibilities of using non-traditional edible materials to produce healthy food with required functional characteristics
- A complex strategy for the assessment of the link between organic food and food from production systems with low input production system and healthy nutrition
- Drafting the concept of a database for interpreting the results of epidemiological studies focusing on the food – health relationship

food ingredients and quality, safety and authenticity indicators

- A study of the representation and forms of occurrence of various groups of nutritionally significant components, both major and minor (relating to their biological availability) in new, non-traditional raw ingredients and products
- Natural toxic, anti-nutritional and allergenic ingredients in food sources and products, assessment of their stability and interaction with food ingredients
- Chemical and biochemical reactions occurring during the production, storage and distribution of food ingredients and products, creation/degradation of biologically active products with positive or negative effects on the health of the consumers
- The position of "new" groups of environmental contaminants and contamination markers/biologically active metabolites in food chains, focusing in particular on endocrine disruptors
- Studying the development of antibiotic resistance in pathogenic microorganisms spreading through food
- Studying "new" pathogenic microorganisms and the factors influencing their virulence

- Studying the survival physiology of said microorganisms, focusing on their survival in the conditions of food processing
- Creating and validating a prevention/management strategy of a microbiological and chemical terrorist attack on the human food chain

modern methods of food analysis

- Development and validation of a sampling scheme for food ingredients and products
- Development and validation of fast analytical/bioanalytical procedures (including biosensors) for the effective monitoring of the quality and safety of food, feed and ingredients
- Development of advanced procedures for identifying counterfeit food and the introduction of instruments for the tracing of their origin
- Development and validation of fast microbiological methods based on immunochemical and molecular biology methods for pathogenic microorganisms
- Development and validation of new chromogenic selective media for target pathogenic microorganisms
- Development and validation of new methods for determining staphylococcus enterotoxins
- Development and validation of methods for determining GMO presence in food ingredients and feed
- Modern chemometric procedures for the interpretation of analytical data, database management

processing (bio)technologies and food manipulation

- Development and implementation of new, safe post-harvest (bio)technologies, aiming towards an effective protection against harmful agents
- Development of new (bio)technologies enabling the production of food with longer lifespan/freshness
- Modern food packaging technology for storage, transport and distribution purposes
- Development of specialised food (packs and sets) to secure the nutrition of a larger number of persons in the field, for states of emergency
- Optimisation of the strategy for identifying, managing and communicating chemical and microbiological risks related to food intake
- Studying the survival physiology of microorganisms in the conditions of food processing

AREA OF ADVANCED BIOTECHNOLOGY

Main research areas:

- the properties of hybrid and transgenic organisms, obtaining new information on the role of genetic and epigenetic factors in the regulation of fundamental molecular biology processes;
- preparation of highly efficient production cell lines and organisms;
- preparation of organisms for the biodegradation of environmental pollutants and waste from industrial production;
- creating stable genetically modified organisms (animals and plants) for agriculture and related fields;
- finding new biocatalysts for chemical and pharmaceutical production;
- new production programmes for the chemistry, food and pharmaceutical industry, enabling economic development and increasing the competitiveness of Europe.

Priority research areas in ENVIRONMENT

The central theme of environmental R&D is sustainable development, with both natural science and technology aspects.

Priority themes of the Czech Republic in the area of environment:

Protecting the environment and using ecosystem services to support the sustainable development of the society – focus on resolving groups of problems related to the protection and sustainable utilisation of natural resources. The goal is to contribute to:

- the protection and sustainable use of landscape, revitalisation of landscape damaged by human activity, support of ecological functions, particularly processes close to nature, including the assessment of the impact of landscape use and revitalisation methods on the individual elements of biodiversity and human health
- ecosystem protection and care, protection of biological diversity, including the protection of the genetic variability of wild growing plants and animals living in the wild, improving the biological diversity of forests by supporting landscape use methods that are close to nature and environmentally friendly, and strengthening the non-production functions of forest ecosystems and agroecosystems
- protection of the soil (limiting nutritional degradation, acidification, contamination and erosion), mineral environment, bodies of water and their mutual relations, including their protection against anthropogenic influence and the increase of water retention in the landscape

- introducing measures to optimise the attractiveness and traversability of landscape for organism migration
- enhancing the knowledge of the effects of anthropogenic activities on valuable natural areas and the influence of geofactors on the environment
- development of the knowledge of tolerant plant species suitable for environment significantly affected by human activities

Optimal use of the landscape – regarding soil quality, water management, accessibility for migrating organisms, influence of geofactors on the environment and increasing water retention in the landscape. Emphasis should be put on:

- restoring permanent and continuous monitoring of the state and trends of development of the functional utilisation and arrangement of the territory of the Czech Republic and the modelling of further possible development;
- creating a system for efficient and optimal territory use;
- defining the principles of landscape care, in all its components;
- resolving the issue of diminishing landscape – defining areas where construction is restricted, for soil and landscape protection;
- using marginal soils in the mountain and sub-mountain regions;
- enhancing the knowledge of the threat level of environmental pollution of terrestrial and water ecosystems, with regard to their sensitivity;
- new methods and models for land use impact analysis;
- minimising industrial impact, with respect to the current and future use of the land;

Impacts of global environmental and climatic changes on the territory of the Czech Republic – resolving the groups of problems related to prediction in environmental protection, including its economic and social aspects, in the context of a global change:

- biogeochemical element cycles – the influence of climate change on the biogeochemical cycles of the major chemical elements, particularly carbon, nitrogen, sulphur, phosphorus and other elements, including heavy metals and some anthropogenic organic compounds. The consequence is a rapid reduction of biodiversity at all levels and endangering the ecosystem services.
- climate change and its consequences – precautions mitigating the impact of climate change; adaptation measures to reduce the harmful effects of the changes of the climatic system, modelling impact predictions of the current and future situation based on paleo-data and long-term monitoring of complex ecosystems (LTER, BR, WFD, Natura 2000).

Environmental technology – waste management – the re-use of waste, the protection of the atmosphere, hydrosphere and soil from contamination, cultural heritage protection. Research should mainly focus on:

- Reducing the pollution of the individual elements of the environment (particularly the atmosphere and the hydrosphere) and their protection
- Efficient waste management, prevention of creating excess waste and using waste as a raw material
- Protecting against the negative effects of natural disasters by landscape modifications
- Influence of heterogeneous substances on ecosystems and human health
- New methods for monitoring the contamination of the individual components of the environment by chemical substances
- The development of technologies for the research of mineral environment suitable for the storage of radioactive waste, highly toxic waste, CO_2 etc.
- Implementing efficient technologies of cultivating required plants (producing biomass, using tolerant plant species in landscaping programmes etc.)

PRIORITY RESEARCH AREAS IN CULTURAL HERITAGE

Sustainable cultural heritage – resolving the groups of issues relating to the preservation and long-term sustainable protection as well as sustainable socio-economic use of cultural heritage, exposed to global climatic and social hazards.

The research will focus on:

- Preventive protection of cultural heritage using the results of research in intelligent monitoring; improving the identification of damage and destruction of historical materials and constructions. Developing early warning systems, methods for early intervention planning and predictive maintenance procedures.
- Integrating cultural heritage into the urban and natural environment requires a broader research of the methods of determining and assessing the impacts of sudden and gradual human activities or natural events on the preservation and changes in value of the cultural and historical environment.
- Energy efficiency of historical buildings – research of cost efficient systems for climate control in historic buildings

PRIORITY RESEARCH AREAS IN EARTH OBSERVATION

Earth observation and environmental assessment tools – resolving the groups of issues related to Earth observation and the development of prediction methods and assessment tools.

The goals should be:

- Developing interoperability between information systems in the field of environment and the optimisation of information, for increased efficiency of public administration and general information accessibility
- Developing prediction methods and tools for evaluating environmental parameters, including the modelling of economic and social dimensions of sustainable development
- Analysis and evaluation of the trends in the development of environment component change indicators, in relation to the use of natural resources, development and use of new types of indicators
- Development of process modelling in ecosystems, mutually linked to technological progress in collecting information about the natural environment (regarding both quantity and quality)
- Development of the models of substance distribution, transport and persistence in the environment
- Development of models for the analysis of environmental and health risks, including assessing the impacts of technologies

Support of effective monitoring of the state of ecosystems using European programmes – LIFEWATCH, LTER-Europe, Natura 2000, Water Framework Directive and national networks, e.g. river basin monitoring, the Elbe/Labe Project etc. Include water (reservoirs, rivers – within basins), soil and landscape (agricultural, forest, "urban") ecosystems, secure communication (interoperability) between systems and data availability and processing. Provide complex information on the environment for public administration.

QUESTIONS:

- Should not be intensified research in sustainable use and management of global strategic natural resources – soil and water which are essential for ensuring food security of growing world population?
- Should not be intensified and further coordinated collaboration with third countries in order to respond global societal challenges and solve global environmental and food security problem?
- Should not the EC enter into the JPI through the FP8 ?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF ICT

Overview of strategic areas

A) The Internet and communication

Interactive digital communication

The Internet and modern communication technologies (e.g. digital television) are opening a way towards full-scale, multi-directional communication, the importance of which will increase in the following years. It will be necessary to merge the research of real-time work with complex distributed environments. Interactivity also calls for the development of new communication interfaces. And last but not least, it will be necessary to develop new transfer technologies, providing adequate capacity and low latency.

Technology for landline and mobile optical networks

The only practicable way of satisfying the constantly growing requirements for data transfer and processing is the switch to optical methods. New approaches lead to the creation of integrated, communication-sensory optical networks and systems with a distributed intelligence on the one hand, and to optical mobile networks based on the multipoint-multipoint connection principle on the other. The research of these networks is interdisciplinary, including ICT, measuring technology, fibre optics, optics and precise mechanics, together with material engineering and electronics.

B) Software

Computer modelling and simulation

Today, computer modelling has clearly become the fundamental element of high-quality project design, replacing traditional development following the trial-error-improvement path and enabling a better and faster design process. Mathematical modelling tools are based on fundamental research in mathematics and information sciences, but are increasingly often becoming standalone commercial products with very low material costs and exceptionally high added value.

Processing and presentation of knowledge

Knowledge systems as systems collecting, storing and especially using knowledge will play a very important, perhaps key role in the economic development of this century. While today, attention is focused mostly on information storage and use, in the second decade of the 21st century it will shift towards the ability of automated retrieval of knowledge from data, both structured and unstructured (e.g. the free flowing text of medical records etc.).

Thanks to the Internet, communication and knowledge sharing has reached a new quality level, requiring the development of sophisticated tools for working with multimedia information. A specific area in this respect are the technologies of e-learning, the further development of which is a necessary prerequisite for the further development of the lifelong learning process of the people of the Czech Republic.

Knowledge integration

Currently, we see a rapid development of single, relatively isolated information and knowledge systems, such as the systems processing geodata, e-health type systems, e-government etc. Building an infrastructure for the sharing of data and services in the environment of the Internet enables the adoption of a new concept of data management and distribution, as well as a new concept of creating and using services within distributed information systems. The integration of knowledge and information systems and the integration of both existing and planned Internet services will result in major synergy effects and new ways of using the Internet in public administration, manufacturing enterprises (including a fundamental support of virtual companies), individual households and people.

Systems supporting decision making in biomedicine

Contemporary medicine is facing the pressure of a steadily increasing amount of data from laboratory and imaging diagnostic methods. In this dynamically developing environment, the traditional methods of storing and extensively using data in medical information systems do not any more provide adequate room for output management. Current technological development must therefore focus on new approaches to managing, storing and using electronic medical documentation. Special attention must also be given to the development of information-based medicine, which represents the process of systematic re-evaluation, assessment and use of scientific and research knowledge and conclusions to provide optimum clinical care to the individual patients.

Efficient development of reliable software systems using components

The use of software components has already become a common element of the software creation process. The practice, however, pragmatically chooses to ignore long-term open issues – in particular guaranteeing that the design does not only cover the basic function of the software, but also its additional characteristics (such as reliability or efficiency), keeping the link between the properties of the design and of the final product and being able to perform formal modelling and verification of these properties. It could be realistically expected that even though these long-term open issues will not be fully closed, research and using specific aspects of software components will help in significantly broadening the possibilities of resolving these problems in specific, practical contexts.

C) Chips, embedded systems and distributed systems

Transport and telematics systems

The systematic development of transport and modern transport infrastructure is an essential part of the strategy of sustainable development and an important prerequisite to further economic prosperity of the society. The task of transport telematics is to integrate information and telecommunication technologies with traffic engineering to secure for the current infrastructure systems of managing transport and freight processes and to increase the efficiency of these processes (transport performance increase, higher safety, better comfort for travellers and less harmful impacts on the environment). The fundamental components of transport and telematics systems include electronic payment (for services, for using the infrastructure, vehicle etc.), management of safety and rescue measures, management of traffic processes, management of public personal transport, support for vehicle driving, support of rational personal mobility, support of traffic regulation compliance monitoring, management of freight transport and also the development and management of transport databases.

Healthcare and telemedicine

Personalised healthcare is becoming an important element in the improvement of prevention, treatment and rehabilitation. It uses not only data gathered by directly monitoring a person or patient's health state, including sensor data, but also data describing the individual's lifestyle, environmental influences and genetic profile. The development of the methods of remote monitoring of selected data important for human health and the means of transferring this data to a technological centre for further assessment and, if needed, taking action, is an important task of telemedicine. Reliable and precise information about a patient will become better accessible at any time, any place, no matter where the data are stored. Using these technologies will also have significant social and economic impacts on home care.

Coordination and cooperation in distributed systems

The research of coordination and cooperation in distributed systems should primarily focus on the development of algorithms for the optimal communication between autonomous, intelligent, highly distributed units (agents) and algorithms storing and maintaining knowledge of the behaviour of the unit itself and other units, creating and sharing knowledge ontologies, establishing suitable platforms for the knowledge integration of distributed units. Attention must be given to communication interoperability and safety and methods of simple integration of isolated (legacy) modules into the activities of more complex systems (agentification issues).

D) Intelligent environment and robotics

Systems with built-in intelligence

Systems with built-in intelligence are a fundamental part of the added value of products. They consist of specialised integrated circuits, programmes, circuit interface, user interface and a mechanical solution integrating the whole. In all of these areas, there is room for specific research and development, for which the Czech Republic has good qualification. The main benefit of built-in systems is that they allow differentiating the product, adding services required by a particular user type – e.g. enabling a relatively easy modification of a product for different languages.

Intelligent human-machine interface

In the future, humans will increasingly more often communicate, interact and cooperate with computer-controlled machines and equipment. The efficiency of communication depends to a large extent on the quality of the human-machine interface, for both communication directions. In this area, successful research is already being carried out. A new factor will be the building of higher intelligence systems directly into the human-machine interface. These will be e.g. systems filtering out the voices of other speakers, adapting reception thresholds to the noise level of the surroundings, learning from their own activities etc.

Computer sight and computer graphics

This theme focuses on one of the key technologies providing human-machine interaction: computer sight and computer graphics. These two areas, previously separated, are increasingly becoming one. On the one hand, the task is to create machines that reliably select useful information from the huge data flow of cameras monitoring the outside world; on the other hand, information and knowledge provided by the machine must be presented to the human in a readable form. Promising areas of research also include the development of virtual reality and individualised television methods.

Industrial robotics

Classical robotics, in the form of stationary industrial robots, has almost reached perfection. Further development will be made mostly in the field of mobile robots, and specialised applications of stationary robots. For stationary robots, this will be primarily the cooperation of multiple arms and better manipulation capabilities (e.g. surgery robots). The area of mobile robotics is much more open to research, has greater application potential and is naturally linked to the research and use of artificial intelligence.

Intelligent machines and robots for humans

The aim is to develop solutions that can interact with humans and make their activity – work or entertainment – easier, or overcome the obstacles of a user's disability or age. The range of advanced robots in development should therefore be broad, from specialised medical and compensation aids and working tools to autonomous equipment of the manipulator type. The goal is not to construct a humanoid robot, but new compensation and rehabilitation equipment or new solutions of common everyday tasks.

Monitoring and diagnostic systems

Diagnostic processes, monitoring and prediction play a key role in increasing the quality and reliability of products and manufacturing processes. They are also the basis of a wide range of technologies and methods improving the operational safety of equipment as well as other security solutions, including communication security. They are also indispensable in healthcare etc. The aim is to develop advanced monitoring, diagnostic and prediction methods the application of which will result in more precise diagnostics of the equipment's function and material properties in operating conditions, more accurately predicting the equipment's lifespan and defining the requirements for predictive maintenance while lowering the costs of maintaining the equipment's reliability and safety. In diagnostic methods research, two tendencies should be supported, in accordance with worldwide trends – the first a significantly greater involvement of mathematical sciences in the formal modelling of events, situations and processes, and the other a more thorough linking between the technologies of industrial practice, based on very specialised knowledge of a problem area, and artificial intelligence technologies founded on mathematics. The development of proprietary methods and systems will increase the competitiveness of our industry and will also be a valuable export commodity.

E) Data and user safety

The current world is to a large extent becoming virtual; real transactions between physical users made by exchanging units of a material nature are moving to the cyberspace. The Internet is used not only as a working tool of governmental and non-governmental institutions, but also a common part of everyday life. New technologies support economic globalisation, with expectations of an even deeper penetration of IT into state structures and with it the society's increased reliance on information technologies. New technologies are however also used by criminals, who can not only organise more easily, but also broaden the scope of their activities or decrease the probability of detection. The frequency of illegal activities is increasing, as is the number of attempts to abuse information and telecommunication systems for illegal purposes. Cybernetic threats are becoming a phenomenon of the 21st century. As they are

growing increasingly sophisticated, new and effective methods must be constantly sought, to either eliminate or at least reduce them.

QUESTIONS:

- How should the FP8 ensure coherences and synergies of activities in cross-cutting priority of ICT with activities in other priority areas (health, safety, etc.)?
- Should not any additional systemic support for activities related to the successfully completed FP7 and FP8 projects be provided?
- How should the links between the FP8 and the CIP be strengthened in order to better coordinate support of research, development and innovation in ICT?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF SAFETY RESEARCH

Since the beginning of the 21st century, the Czech Republic has been confronted with new security threats – international terrorism, organised crime, potential proliferation of weapons of mass destruction, regional conflicts, information security threats, volatility of the financial markets and others. The current approach to designing security precautions, focusing more on their organisational and technological aspects, must be broadened to include a systematic handling of security issues, including socio-economic and cultural aspects. Therefore, areas that focus on developing methodologies, procedures and security systems should be strengthened, as even the best technologies and skills may fail if there is not an adequately set-up system for the prevention and elimination of security risks. These systemic precautions, including among other things the active participation of the public and society in providing security, are also a suitable area for international cooperation in R&D and for joint projects, which can be organised on an international level within the framework of the 8th FP.

Regarding the general requirements for security research, it is clear that all areas defined in the European Security Research Agenda are significant in improving safety. In relation to the evaluation of the capacities of security research in the Czech Republic and the needs of the public administration in this field, selected areas have been identified on which the Czech Republic should focus during the preparations of the 8th Framework Programme. In their identification, the current research capacities and requirements of the state administration have been taken into account, as well as the current participation of Czech research teams in the PASR programme and the projects of the 7th FP.

The identified thematic areas are structured based on the 8 basic themes identified in the ESRIF report and taken into account in the European Security Research Agenda. In each thematic area, both the "Research capacities of the Czech Republic and their potential for inclusion in international cooperation projects" and the "Research needs of public administration bodies in the CR" are evaluated. For graphical representation, see Appendix Z.

A. Public security

Protection of the public against terrorism and organised crime

Research aimed at fighting terrorism and organised crime is considered a very strong need, which is reflected both in it being most represented among the projects of the national Security Research Programme of the CR in 2010–2015 and in the largest number of research needs identified in this area by the public administration bodies in the Programme of Security Research for the Needs of the State in 2010–2015. In this field, Czech research teams focus on a variety of topics, from the development of inhibitors protecting the public from bioterrorism, monitoring systems or the detection and elimination of explosives to sociological research of corruption. **On the international level, Czech teams take part in research collaboration particularly in the area of public protection against ballistic weapons and CBRN terrorism.**

Security of environmental services

Here, the research focuses among other things on integrated assessment and analysis of environmental service risk, potential impacts of nature disasters or chemical and nuclear accidents on the safety of environmental services (adequate supply of quality water, tillable soil, food etc.), scenarios and modelling of environmental services in the context of public security threats, quantification and appraisal of the environmental services and the possibilities of their substitution. The research in this area is increasingly more often seen as a society-wide need, especially in connection with the rising number of large-scale natural disasters (floods). **The CR actively participated also in the work of the NATO "Environmental Security" expert panel.**

Cybernetic security

The main challenge of security research in this area is the protection of citizens and their data against the misuse of information and communications technologies and systems (increasingly sophisticated) for illegal purposes. Many public administration bodies feel the need for intensive research in this area, in particular the Police of the Czech Republic. **A major part of the protection against cybernetic threats is the exchange and sharing of information in fighting cybercrime on the national and international level, creating a significant potential for cooperation in the security research in this field.**

B. Security of key infrastructures

Security of energy infrastructures

The research need most felt in the area of securing critical infrastructures is the analysis of risks in facilities generating and distributing electricity. The need of systematic protection of the safety of distribution networks is felt throughout Europe. **A Czech research team has been involved in international cooperation in a project of the 7th FP, focusing on the identification of the volatility of electricity generation and distribution systems, their protection and restoring their functions.**

Security of key infrastructures relating to persistent organic pollutants

Protection (detection, elimination) against the effects of persistent organic pollutants is primarily the concern of the security of key infrastructures of water management, agriculture and the food industry. In this area of security research, the Czech Republic takes part in many projects and activities of the EU, NATO, UNECE and other programmes (among other things, we for example provide international aid in Moldova, Armenia and other countries). **World-class research in this area is carried out at the Masaryk University in Brno. For research of public safety and the safety of the environment and critical infrastructures regarding the effects of toxic substances, more capacities will be created within the CETOCOEN project** supported from the Research and Development for Innovations Operational Programme.

C. Border security

Perimeter protection

Because of international obligations and the location of the Czech Republic, state border security was not included among the priority areas of security research identified by the Interdepartmental Concept of Security Research and Development in the CR for 2015. From a broader perspective, however, border security may include the protection of installations, buildings and premises (perimeter protection). From this point of view, perimeter protection is an important challenge to security research, related to the safety of the public and of critical infrastructures (see above).

D. Crisis management

ICT for crisis management

Information and communications technologies are a key instrument of risk and crisis management, early warning systems and efficient communication with the public. **Research in the field of ICT for crisis management is carried out in the CR e.g. at the Institute of Information Theory and Automation of the Academy of Sciences or at the VŠB – Technical University of Ostrava. An important role in this area is played by smaller businesses which, in addition to national projects, also take part in the international R&D**

cooperation within the Framework programmes of the EU. Using ICT for the modelling, simulation and management of crisis situations will also be one of the research goals of the new IT4Innovations Centre of Excellence, built by the VŠB-TU Ostrava and financed by the Research and Development for Innovations OP.

For crisis management, another important research field are the tools and equipment of the agents of the Integrated Rescue System of the CR (Police of the CR, Fire Brigade, Medical Emergency Service), improving the efficiency of their activities and protecting their lives and health; this includes training, its methodology and used equipment. In the CR, the Institute of Public Protection Lázně Bohdaneč of the Directorate General of the Fire Brigade has a strong position as both an initiator and a research body.

E. Outlooks and scenarios

Security prognosis of the development of the CR and the EU

Currently, there are many various prognoses of the long-term development of the security of the world, based on the broadly defined concept of security. Within the Global Context Study for an initial ESDP Long Term Vision (EU) and the Future Strategic Environment (NATO), the general security model is varied – from military security of a sovereign state to international (global and regional) economic, social, technological, and environmental or human rights dimensions of security. Research in this field in the CR focuses mostly on the impacts of the various scenarios of security development, both in the world and in Europe, and the security system of the CR. **On the international level, Czech teams cooperate in projects focused on the drafting of an efficient security policy and the creation of complex scenarios of the development of EU security.**

F. CBRN *(chemical, biological, radiological and nuclear)* safety

The issue of **identification, protection against and elimination of the negative effects of CBRN substances** is the focus of many projects financed by the Security Research Programme of the CR in 2010–2015. Research of protection against the negative effects of chemical, biological, radiological and nuclear substances is also considered very desirable by the public administration bodies.

In the field of CBRN research, the CR has several high-quality institutions – **the National Institute for Nuclear, Chemical and Biological Protection, the Institute of Public Protection Lázně Bohdaneč of the Directorate General of the Fire Brigade and others, including the NATO Joint CBRN Defence Centre of Excellence in Vyškov. Other Czech entities (in particular the VŠB-TU Ostrava, the Occupational Safety Research Institute and the Technical University Liberec) are taking part in activities related to the**

research of the elimination of cross-border spread of chemical accidents (UNECE Joint Expert Group), OECD Working group on chemical accidents and others.

Regarding international research cooperation within the 7th FP, the National Institute for Nuclear, Chemical and Biological Protection is one of the most commonly encountered Czech representatives in the Security projects of the 7th FP.

G. Situational preparedness and the role of space

Integrated systems

The goal of research in this area is in particular the creation of distributed automated management systems, to ensure the safety of communication, coordination and cooperation between the subsystems, and the development of complex systems of prevention, early warning, reaction and restoration. An important challenge of security research in this field is the development of technologies, methods and procedures to increase the level of situation preparedness, preferring knowledge and technologies supporting information sharing, international cooperation in the area of data sources, monitoring and reporting and safe and reliable communication between the individual security units and teams. This area is thus closely related to **crisis management**. **The key element of security research in the area of integrated rescue systems in the CR is the Institute of Public Protection Lázně Bohdaneč of the Directorate General of the Fire Brigade, under the competence of the Ministry of Interior. This institution also actively participates in international cooperation R&D projects in its field (e.g. the COUNTERACT project).**

H. Person and property identification

Security research in this area focuses mostly on the issue of identifying persons (biometric identification) and objects, the procedures of crime investigation, using chemistry, biology and physics methods in crime investigation, technologies for identification and verification, usually in connection with forensic and physical approaches. The importance of this area of security research to the CR can be seen in the large number of research needs identified by state administration bodies (in particular the Police of the CR). Research into the identification of persons and property is also a common element of many projects supported by the national Security Research Programme of the CR in 2010–2015. **The potential for international cooperation can be seen here especially in the research of identification technologies.**

QUESTIONS:

- The importance of R&D in security is growing gradually. Should the security research (as a cross-sectional area) be supported as a separate priority area of FP8, or would it be better to set aside part of the financial resources in each priority for security research in the respective area?
- How should the FP8 ensure coherences and synergies of activities in crosscutting area of Security with activities in other priority areas (ICT, health, environment, etc.)?
- Should not any additional systemic support for activities related to the successfully completed FP7 and FP8 projects be provided?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF SSH

A) Main ways of involving SSH

In the context of European research, SSH must be involved in several various ways.

– the framework programme should continue to support interdisciplinary projects dedicated to topics that are important on the European level, including social, economical, demographic, political and humanities topics.

– SSH should be involved in solving the "great challenges" which always include many socioeconomic and humanities aspects.

– the 8th framework programme should also support excellent SSH research through individual grants (continuing the "Ideas" programme).

B) SSH priority strategy recommendations

1) Finance the key top databases and infrastructures used to collect high-quality, internationally comparable data or to secure access to existing data that are absolutely essential for carrying out high-quality European SSH research.

2) Include research topics encouraging the cooperation of SSH and the exact sciences – interdisciplinary approach, which is the "trademark" of FP, should be broadened towards the natural sciences.

3) Encourage small-scale cooperation projects which are much more flexible than large projects, can involve more partners in their priorities and their larger number helps avoiding the trap of one-sided research.

4) Include in the projects an analysis of the specific conditions created by cultural history and traditions, which are fundamental for applying policies, mechanisms and strategies developed by the projects.

5) Research and development of the possibilities of efficient access to large public SSH databases using Open Access; if the databases are confidential, use mathematical models for their accessing.

C) Proposed research topics

1) Methods of extracting knowledge from data and using it in economic decision making
2) Multidisciplinary support of managerial decision making in a knowledge-based company
3) Deficits of public financing – the threat of the next decade
4) Common monetary policy – an obstacle or an incentive to the dynamic development of the economies of the EU countries?
5) Population aging and changes in the life cycle – consequences for age identity, the job market, healthcare and social policies and cross-generation communication
6) Economic and social sustainability of the measures taken to lower CO_2 emissions in the light of unpredictable climate changes
7) Ethical questions in biotechnology research, medicine and healthcare policies
8) Societies in the post-socialist conditions
9) National and language identity, European identity, migration, immigration and integration
10) The social and cultural context of forming identities, with respect to the regulation of the behaviour of various entities (individuals, groups, organisations)
11) Language rationalisation and multilingualism in the European Union – language teaching, teaching in languages, the obstacles of language skill development, the inequality of language skills, the infrastructure of language rationalisation
12) Changes in human behaviour and forming of new habits and thinking patterns caused by the new technologies
13) Consequences of the homogenisation of media channels? Simplification of communication, new illiteracy

14) Key factors of well-being in the European context – general characteristics and specifics of the individual countries

15) Are dynamically developing knowledge-based societies truly based on knowledge? (Issues of functional illiteracy, lifelong learning and education targets)

16) Invisible borders and the multitude of identities in the urban space

QUESTIONS:

- Socioeconomic issues are often very complex. Should not be this fact reflected in a larger number of projects concerning one theme? (Now, there is one project per theme).
- How do you evaluate the output and impact of large projects? Is the impact adequate to the budget and to the impact of small and medium projects with a budget 2.5 times smaller?
- SSH is a priority with the lowest success rate. Does the Commission plan to change this trend? If yes, how?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF THE EUROPEAN RESEARCH COUNCIL

The Czech Republic supports the retaining of excellence as the sole criterion for the evaluation of projects and the assignment of positions in the ERC Scientific Council. It proposes to create mechanisms for the support of interdisciplinary and high-risk projects. The CR supports further enhancing of the autonomy of ERC, its independence on the European Commission, or rather its political dimension. As the form of an executive agency is not necessarily optimal for the existence of the ERC, its total independence on the European Commission should remain an option for the 8th FP, in accordance with Article 171/169, as amended. This option should be re-evaluated after two years regardless of the situation, not only in the case the current structure (executive agency) fails.

The European Commission should secure optimum information flow and strive for maximum transparency, both in the sense of prompt and timely data entry (CIRCA, E-CORDA) and providing information about the composition of panels (NCP or within the EC database), as well as in regard to processes. It should implement a mechanism of rotating the scientific council and evaluation panels, with the option of nominating experts on the national level. As before, expert panel members should be appointed solely based on their expertise, using similarly high standards as those expected from ERC programme applicants. At

the same time, the EC should keep the representation of individual member countries reasonably balanced.

Regarding the principles of the functioning of the ERC, the Czech Republic supports keeping its current autonomy as the main resolver and the principle of grant transferability. It proposes simplifying the mechanism of project financing. From the point of view of the Czech Republic, it would be necessary to abandon the system of subsidies based on a structured budget and switch to a system of "lump sums" or a total project "cost". It is also necessary to shorten the time span between submitting an application and signing the grant agreement, and in particular to limit the time some projects spend on the reserve list.

The CR recommends to the EC to request an analysis of the significant differences of success rates in the Ideas specific programme between the individual countries on the level of the European Commission, in particular in comparison with the new member countries of the EU (EU-12). *The CR considers advisable a further development of complementarity with the other community programmes of human resources development in R&D. The goals of the "People" specific programme (the Marie Curie Actions, MCA) must be better structured, to allow desirable synergies. Actions like MCAs should also focus on the support of in particular young people with the potential to become top researchers. Similarly, there is a lack of systemic support of the growth of highly qualified scientific and technician staff (often with PhDs and extensive professional competence) who ensure the operation of unique research infrastructures, enable their activities and/or are parts of excellent research teams.*

- as an instrument of the support of excellent research in the EU, the ERC should undoubtedly be kept in the 8th FP and should be significantly strengthened
- develop a mechanism for the support of interdisciplinary and high-risk projects
- strengthen the autonomy of the ERC (independence on the political dimension), for example by utilising Article 171/169, as amended
- increase the budget, in view of the much lower success rate (14%, i.e. 6% difference) compared to the 20% average of the FP
- strive for maximum transparency (prompt data entry into e-CORDA, CIRCA) and the optimisation of information flow towards the member states and the public
- create mechanisms for nominating experts and rotating the scientific council, as well as a process of appointing members of expert panels (based on expertise/excellence, but respecting a balanced representation of the member states)

- the CR proposes to have an analysis performed on the level of the EC, focusing on the significant differences of success rates between the individual countries, particularly in comparison with the new member countries.

QUESTIONS:

- ERC aims to support research at the frontiers of human knowledge - thus, essentially "basic research" - it may (and it does) also support research in technical and technological domains. However, the "Excellency" and the "research part" must be retained. Results of cutting-edge research may have direct applications and can even be directly commercialized. How to support links to innovations and maintain the mission of the ERC at the same time? How to estimate the market value of these results that are achieved by considerable public support? Is there a mechanism or supporting instrument foreseen for the upcoming programming period?
- ERC and research infrastructures: ERC provides in justified cases the principal investigator with additional support (up to 0,5 MEUR) for purchasing expensive research equipments if this is directly required by the project. Such a support scheme doesn't apply for subcontracts and services. However, certain scientific disciplines require access to huge scientific infrastructures (national, European, others). Often the use of these facilities is connected by sizable costs, or with additional evaluation procedures in cases "open access" is provided. Is it foreseen that paid access to infrastructures can be claimed at the same conditions as "additional investments"? Shouldn't access policies (of pan-European infrastructures) be changed such that it allows granting "open access" to ERC grant holders at preferential treatment (as they underwent already a serious evaluation procedure)?
- ERC and ERC: Shouldn't an ERC Grant holder alumni network be created? Should not special scientific ERC conferences and summer schools be supported by CSA type of instruments? Is the relation between the two instruments IDEAS and PEOPLE both, claiming for excellence well understood?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF HUMAN RESOURCES IN RESEARCH

- The CR welcomes the grouping of all reintegration grants into a single category (CIG). For simplification and better orientation, it recommends for the future **concentrating actions to a smaller number and limiting the creation of new actions**.
- Harmonise the procedures of DG Research and DG Education and Culture; clarify the status of a doctoral candidate – student or researcher.
- **As MCAs are now in the competence of DG Education and Culture, the CR considers advisable the further development of complementarity with the other community programmes of human resources development in R&D.** The goals of the "People" specific programme *(the Marie Curie Actions, MCAs)* must be better structured, to allow desirable synergies. Actions like *MCAs* should also focus on the support of in particular young people with the potential to become top researchers.
- Similarly, there is a **lack of systemic support of the growth of highly qualified scientific and technician staff (technicians/operators with university education) that ensure the operation of unique research infrastructures, enable their activities and/or are parts of excellent research teams.** The CR proposes creating a new action to support the mobility of these researchers and technicians in European research infrastructures.
- *SP PEOPLE* should continue to cover all thematic areas without any limits ("bottom-up"), as well as all areas of the scientific careers of researchers (from training networks for junior researchers to supporting the professional development of experienced researchers and providing reintegration grants).
- Do not modify or merge actions in the duration of a framework programme. Changes within individual working programmes create problems, both for institutions and researchers.
- In this respect, also consider simplifications, particularly in reporting costs using a result-based system (evaluate the report of a guest scientist, but provide a flat rate without a need of detailed accounting) and pay more attention to specific examples regarding acceptable costs.
- The CR recommends better propagation of *MCA actions* intended for researchers from third countries.
- Consider the introduction of an incentive component aimed at new member countries, because of the low number of guest researchers from third countries.
- Because of the importance of *Training networks (ITN)* to education and brain circulation within the ERA and the frequency with which this action is used in

SP PEOPLE, the Czech Republic proposes increasing the budget for this type of projects.

- For individual actions, the CR recommends[4]:

a) Reintegration grants – because of the relatively low benefit (in new CIGs 25,000 EUR per researcher per year) and the targets for permanent reintegration and establishing of a researcher in the selected host institution in ERA, cancel the condition of a full-time commitment to an MCA project declared in Annex II of the Grant agreement, thus allowing the financing of the researcher's position from multiple sources (e.g. by declaring a minimum commitment to the *MCA* project, similarly to for example the ERC)

b) *COFUND* – allow researchers financed from *COFUND* to work on an MCA project with a lesser than full-time commitment – i.e. enable the multi-source financing of a researcher and the possibility of covering their team from the grant as well.

- We recommend keeping the broadened version of *European Reintegration Grants (ERG)* as they appear in the 2001 working programme, i.e. for all researchers regardless of the grant scheme used for financing their stay abroad (e.g. the reintegration of researchers financed from lifelong learning programmes).
- **In the 8th FP, MCAs should have a clear priority, including a more significant financial allocation than in 7th FP.**

QUESTIONS:

- Specific programme People focuses on development of human resources in R&D but so far it does not really include technicians and operational staff of infrastructures even if those people are highly educated and are absolutely necessary for the running of the RI. Should there not be introduced in FP8 a mobility/training scheme for technicians and operational staff at least of unique research infrastructures?
- Does the European Commission foresee unification of terms and their definition through different schemes focused on human resources development? It mainly concerns FP8 mobility schemes, life-long learning programmes, but also others which fall under DG Education and Culture responsibility. Does the EC plan synergies in those activities? Are synergies also foreseen with structural funds (co-financed by ESF)?

[4] Regarding the provisions of Annex II, Article 2.14, Paragraph 4, Grant agreements, see http://cordis.europa.eu/fp7/calls-grant-agreement_en.html#rea_ga

- Does the EC consider introducing the result-based in mobility schemes where the introduction would be certainly simpler than in case of projects under SP Cooperation?
- Do the current MC actions correspond to the needs of ERA/FP8?
- The operation of the large research infrastructures is based on excellent human resources. Should not the new actions for mobility and development of technical staff for RIs, top management for RIs of European interest be developed?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF LARGE RESEARCH INFRASTRUCTURES

1. In the Research Infrastructures programme of the 7th FP, the Czech Republic is very successful on the European level, especially compared to the other new member states. The success rate of the project proposals of Czech teams approaches 50%. All activities of this programme proved beneficial, which should be taken into account in the 8th FP.
2. Institutions are very capable of combining different financial sources (structural funds, framework programmes, national sources) for the development of research infrastructures and thus further developing their capacities.
3. There are mutual synergies between an organisation's ability to enter a European R&D&I infrastructure project and subsequently receive further financing on the national level, specifically:
    i. Organisations which were successful in a European project also often applied for a structural funds project;
    ii. Organisations with ties to a research infrastructure with a European dimension (project, operation) are usually also successful applicants for support from other framework programme schemes (COOPERATION, PEOPLE).
4. There is a link between being included in European projects and in the Czech Republic's Roadmap of large infrastructures for R&D&I.
5. Research institutions included in European research infrastructure projects demonstrate their European quality, which influences their development on the national level.
6. ESFRI has proven a good instrument in the support of a coherent and strategic approach to creating policies related to European research infrastructures.

7. The integration activities of the 7th FP supported involvement in the projects of the Operational Programme Research and Development for Innovations.
8. In financing "open-access" from European sources, there is a potential for the influx of further finances into infrastructure projects.
9. The linking of large projects financed from the OP R&DfI to major European infrastructures or initiatives has proven a useful and important factor in increasing European cooperation in various areas of research.
10. The OP R&DfI is in the European context a unique applied instrument. It has important synergies with OP Education and Competitiveness, reflecting the coordination of the use of ERDF and ESF sources.
11. Insufficient support of the development of human resources in large research infrastructures is the weak link in their future existence.
12. Research infrastructures are demanding on human resources; therefore, their financial support must be stressed, be it within structural fond synergies (OP R&DfI – OP E&C) or framework programmes. (related to the previous point)
13. Innovation processes of research infrastructures are based on the partnership between research and industry. The potential in intellectual property rights protection, the establishment of spin-offs and their development towards commercial use, founding technology transfer centres, demand-led innovation and the broadening of business goals are a part of the European innovations strategy and are being constantly developed.

Recommendations:

1. continue the Research infrastructure programme, and especially the **integration activities** scheme of the 7th FP (I3-type projects in the 6th FP) and increase its budget;
2. regarding research infrastructures, keep further framework programme instruments – primarily the support of excellent, cooperation-based research, the support of individual excellence, mobility and career development and development policies of the European Research Area; keep the specific support of instruments for the access of small and medium-sized enterprises to the results of R&D as well as additional schemes, such as joint programming and projects of the ERA-NET type; (related to the previous point)
3. finance the scheme of open access to research infrastructures with a European dimension. **Financing "open-access"** from European sources for

the projects of the ESFRI roadmap will also help the sustainability of infrastructure projects.

4. **create a list** of national research infrastructures with a European dimension within the framework of ESFRI; (related to the previous point)
5. **finance the operation of social science and humanities projects** from the ESFRI roadmap, especially regarding automatic open access and added European value;
6. keep the support of the preparatory phase of newly identified research infrastructures from the ESFRI roadmap;
7. further pan-European research infrastructures even outside the ESFRI roadmap in cases of a critical need and clear European added value;
8. **finance the strategies of the construction and development of large infrastructures in cooperation with countries outside the EU** (USA, Japan, Asia and other areas), related to the need of finding interdisciplinary solutions of global challenges, coordinated securing of financial and human resources and innovation opportunities;
9. strengthening international cooperation in large infrastructures, coordinated with the activities of ESFRI and the Scientific Forum for International Cooperation (SFIC); (related to the previous point)
10. introducing systemic solutions regarding the human resources of research infrastructures, including: a) **a scheme for the support of the growth and mobility of highly qualified scientific, operator and technician staff** who ensure the operation of unique research infrastructures on the technical level, enable their activities and/or are parts of excellent research teams; b) **a scheme for the support and coordination of top managing personnel** of research infrastructures.
11. improving the level of joint management of the development of human resources (e.g. the Steering Group on Human Resources and Mobility) and investigating the options of initiating specific coordination activities, e.g. the founding of a European association for the development of human resources for research infrastructures; (related to the previous point)
12. using ESFRI for new activities – related to the creation of a list of "European" infrastructures;
13. synergies between the cohesive policy and the structural funds and framework programmes and the CIP programme, particularly in the preparation of new, pan-European research infrastructures, specifically their preparation phases and knowledge transfer;
14. adopting administrative measures for the support and development of small companies focusing on technologies and using the results of R&D. In this

context, analysing the synergies with the CIP programme is recommended.

QUESTIONS:

- Should not the FP 8 have more and better funded:
  - Integrating activities of existing RIs?
  - Open access for RIs both national and international of European interest?
  - Mobility and development of technical staff for RIs, top management for RIs of European interest?
  - Demonstrators based on the development of RIs?
  - Operational costs of socio economic databases? (They are totally open access)
- Should not be the status and scope of ESFRI in connection with the new needs for evaluation of RIs updated?
- Should not the activities concerning RIs under the 8 FP be coordinated with SFIC, SGHRM, structural funds policy and CIP?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF INTERNATIONAL COOPERATION

Considering the change in the programme structure between the 6th and 7th FP, it can be expected that in the 8th, there will also be an option of submitting specific international cooperation scientific projects based on the priorities defined in the individual thematic groups (Health, Agriculture, Environment etc.). The area of international cooperation as such will remain reserved for institutional cooperation and coordination, intended primarily for the national providers and administrators of research and development programmes. The specific direction of the cooperation will be determined in accordance with the political goals of the Commission, such as the EU2020 strategy, the Innovation Union initiative and the results of the negotiations of the Strategic Forum for International Scientific and Technological Cooperation (SFIC). Therefore, if projects of the SICA category, which may include concrete scientific projects, will remain in some form in the draft of the 8th FP, the support of general programmes focusing on institutional cooperation with third countries will probably remain outside the area of interest of most research institutions in the Czech Republic.

In light of this, it should be considered whether e.g. the government of the Czech Republic, the Government Council for Research, Development and Innovations or the Ministry of Education should specify mid-term and long-term concepts of the direction of international cooperation in research and development, taking into account the priorities of the framework programmes of the EU, to make it possible to use these mechanisms to the benefit of research in the CR. Otherwise, it will be necessary to emphasise primarily programmes more suited to the conditions of the CR. In this respect, the most important projects in the context of international cooperation have proven to be those focusing on the use of newly constructed research capacities, financed now from the OP R&DfI (ELI, BIOCEV etc.) and with uncertain financing sources after 2015. Therefore, it seems suitable to use the potential of these capacities by including them in international projects allowing the access of third countries. There is also room for new scientists and other qualified staff from third countries; however, this will probably remain covered by mobility projects, if they are kept in the 8th FP.

QUESTIONS:

- Should not, with the support of a project from FP 8, be prepared an analysis (assessment or review) of possible coordination of existing S&T (R&D) international cooperation activities at national level in EU member states with the EU ones?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF NEW MATERIALS AND NEW TECHNOLOGIES

To conclude, NMP is a promising FP sub-programme, especially with its focus on the **practical application of research results in the industrial and commercial sector**. In many specific areas of this programme, both research and industrial entities of the Czech Republic are relatively successful in the final results evaluation. At the same time, it should not be overlooked that in many NMP areas the success rate of the CR could certainly be improved. For this purpose, **a better system of more extensive communication with the applicants must be found for more successful applications, as well as other support options for the preparing of specific entities for such cooperation**. Regarding the structure of the prepared 8th FP, it would be useful to **revise the sub-programme structure of the NMP and the content of its calls for proposals, already suffering from excess fragmentation** (see e.g. the call for developing new materials suitable for cast statues and monuments from 20 July 2010). The main **factor in deciding the structure of the programme should be the option to establish criteria, as precise as**

possible, for evaluating and comparing the quality of proposed projects (option of comparing the comparable), **with minimal limiting of the content of the projects by applicants**. This approach will enable transparent decision making in awarding support to the individual proposals, and at the same time will not succumb to specific lobbying influences and, in its consequences, will simplify administrative work.

QUESTIONS:

- Does the Commission envisage more demonstration activities and links with CIP in the area of new materials and technologies?
- Should not an important part of FP 8 be dedicated to new materials and technologies?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF INNOVATION

This chapter lists the recommendations for the priorities of the Czech Republic in the 8th framework programme of the EU, as established in the analyses of the previous chapters. The proposed recommendations are divided into four groups – recommendations to the structure of the 8th FP, recommendations focusing on more efficient innovations support, recommendations related to PPP and those that aim to improve the rules of SME participation and simplify administrative work.

Structure of the 8th framework programme and general recommendations

In the 8th FP, it is to a certain extent possible to follow up from the current system of thematic priorities; these priorities, however, have to be defined in a way that corresponds to the needs of the society (for example using foresight). Strict thematic division of research priorities has for a long time been incompatible with problem oriented research, with interdisciplinary teams participating in the solutions. At the same time, a follow-up initiative must be created for the support of defining national (regional) priorities linked to EU priorities, reflecting the specific conditions in the individual countries.

It is absolutely essential to not only emphasise meeting goals, but also to ensure the projects will present a benefit and create a long-term impact not only for the participants of the projects, but also for the society as a whole. Monitoring and evaluation must be performed on the levels of the individual projects, activities, programmes and the entire 8th FP. In advance, an appropriate system of

indicators (and their target values) must be established; the fulfilling of these indicators will be monitored during the project (programme), after its conclusion and then in predetermined time intervals in the future. It is also necessary to develop appropriate methodology (model) to be thoroughly applied afterwards. Continuous evaluation must be followed by an ex post research impact assessment.

It is also necessary to focus on the development of human resources in R&D&I, particularly in SMEs. For this reason, horizontal mobility between academia and the business sector must be supported, to provide researchers from public research institutions with the point of view of the other side, for their better understanding of the needs and goals of businesses, and giving in turn the employees of businesses the option to develop their professional knowledge and skills in R&D; in this respect, the younger generation should be targeted in particular. It is also important to support the creation of international links between companies (particularly SMEs) and research organisations and businesses abroad. These principles must be further supported in new Marie Curie activities.

Support for the development of innovation activities in the 8th framework programme

With regard to the current strategy of the EU, as declared in the Europe 2020 document **Fehler! Verweisquelle konnte nicht gefunden werden.** and the initiatives being prepared, the priorities, activities and measures proposed in these documents should be reflected in the 8th FP as much as possible. For this reason, it is important to give stronger support in the 8th FP to R&D projects that efficiently stimulate the cooperation of the public and enterprise sectors in R&D&I, with their focus and set goals cover the entire innovations cycle from R&D to the transfer of results into practice and their specific application, and at the same time are headed towards concrete outputs, such as new technologies, products, processes and procedures.

In addition, it is important to launch programmes and support projects with a greater socioeconomic impact, i.e. larger scale and long-term projects developing the strategic cooperation of the public and industrial sectors in R&D&I. In relevant programme types and their individual calls for proposals, the transfer of knowledge into practice and further on the market (national, European, worldwide) must be consistently required (and supported). These programmes must also lead to the inclusion of the entire spectrum of SMEs, from operational companies to high-tech enterprises and companies focusing on R&D.

Such programmes must be created both with a specific thematic focus, in accordance with set priorities, as well as without a pre-defined aim, in which the goal of R&D will be set by the project participants themselves (bottom-up), but

with outputs corresponding to defined criteria such as added value, social benefit, impact etc.

In the 8th framework programme, the **schemes** that were a part of the 7th FP **should continue**, such as the "Research for SMEs" and "Research for SME associations" programmes which focus on the cooperation between SMEs and research institutions in the form of outsourcing research activities. In the new 8th FP, a **more significant part of the budget (approx. ¾) should be allocated to "Research for SMEs" and ¼ of the budget to "Research for SME associations". Demonstration activities should be a part of each project.** It would also be advisable to adjust the financial model of the programme, in particular to **change the rule allowing the providing of subsidies of up to 110% of the costs to the research organisation participating in the project**. **At the same time, schemes supporting the involvement of research-focused SMEs financed from national programmes (EUROSTARS, EUREKA) should continue, keeping their thematic freedom (i.e. bottom-up).**

Partnership of the public and private sectors (PPP)

While there is relatively little experience with PPP in R&D&I, current trends show great interest in such activities from the business side. At the same time, there are certain obstacles and problems. **For example in cases where conditions are defined primarily by the industry, they may not conform to the vision of the academia, and vice versa.** This is something that has to be resolved in the further planning of such partnerships in the future. In some PPPs, there are currently somewhat different rules compared to those in standard projects of the 7th FP, which may be complicated for the participants. If PPPs are to continue, there must be more harmonisation in this area.

SME participation rules and simplifying administrative work

Participation rules of Research for SMEs and Research for SME associations

The long-term trend of simplifying rules (e.g. the option of coordinating a project by any resolver, the option of involving a large company etc.) and minimal rule changes between the individual calls for proposals is commendable. In addition, selection procedures must be made faster, with a single step evaluation for both project types and a simplification in the options of subcontracting some activities (outsourcing).

Also, more emphasis should be put on applying research results on the market (in some national as well as international programmes, for example EUREKA, this is a requirement) and on demonstration activities before the end of the project (e.g. a mandatory scope of demonstration activities, taking demonstrations into account in project evaluation etc.).

The Research for SMEs programme, which is intended for the introduction of innovations in SMEs, is in many cases used for fulfilling the goals of research organisations. This is confirmed by studies of the EC and expert experience. For research organisations, participating in such projects is attractive also from the financial point of view, as their costs are fully covered under the current conditions. On the other hand because of the asymmetric allocation of EC subsidies, these projects are often a substantial financial burden for the SMEs. For SMEs, including those in the Czech Republic, it would be also useful to allocate more funds to demonstration activities, thus making the commercial application of project results easier for the SMEs.

In the long-term, the CR has a low resolver success rate (around 15%); the situation in many other countries is similar. A possible cause could be the creation of elite resolver cliques on the one hand and the difficulty of carrying through projects of new applicants on the other. This situation must be amended in the future, to prevent such occurrences..

Simplifying administrative work

The simplification of procedures as a result of the use of several electronic and other tools (URF, PIC, LEAR, EPSS, the guarantee fund…) and the EC's aim to simplify the administration of framework programmes for research (**Fehler! Verweisquelle konnte nicht gefunden werden.**) are without any doubt positive steps towards simplifying administrative work. In addition, the documentation of calls for proposals (instructions, conditions, rules etc.) should be ideally concentrated in a single brochure.

Financial rules

We recommend **moving from financing based on costs to financing based on results**, i.e. the financing of research projects on a principle similar to the selection and contracting used in public procurement: selecting an application through public competition and carrying out the research project based on a contract between the EC and the resolver, **for a negotiated contract price**. While such system requires greater expertise on the side of the contractor (EC) when negotiating the contract and accepting project results after its termination (review, discussion), as in public procurement this can be resolved by employing a specialised firm. At the same time, we recommend using flat rate EC subsidies as much as possible. The current advance payment cash flow system requires a modification of the financial rules in the favour of SMEs, as the current, asymmetric division of the EC subsidy, i.e. for the benefit of research organisations first and the rest to SMEs, in consequence leads to a large financial burden on SMEs (the idea that the spent money will return to SMEs with the commercial application of the project results often remains unfulfilled).

A platform for supporting small and medium enterprises should also be created, where financial subsidies from the EU would be allocated directly on a regional

level (NUTS II), which would result in better project administration and enable the linking of SMEs to universities/research institutions in the region.

Calls for proposals, the project selection process and negotiations

We recommend prolonging the time between publishing a call for proposals and the submission deadline (three months is a relatively short period). If this is not possible, at least publish information about the upcoming call in advance (e.g. with a press release). Even though the current selection procedure is fairly quick, the time between deadline and project commencement should be made shorter (estimating the start date of the project is difficult, which for the involved institutions means complicated planning of the use of their capacities).

QUESTONS:

- Should not there be a special specific programme for innovation under FP8, or should innovation be included in all specific programmes?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF ASTRONAUTICS

Strategies and visions of the CR for the 8th Framework programme of the EU

Framework programmes of the EU with the financial support of the European Commission are very important for the space industry of both this country and Europe. Space research cannot be efficient without international cooperation and inclusion in European research structures. Framework programmes support national development and international cooperation, increase the effectiveness of research activities and in their own way harmonise the national approaches to R&D of the individual EU member states.

Because of the importance of and growing interest in space research and astronautics and the expected future development of the EU and the world, the Czech Republic recommends including the "astronautics" theme as a separate part of the 8th FP of the EU, with a slightly increased budget for specific areas. **The CR supports an 8th FP with a separate astronautics section.**

Strategic goals of the Czech Republic in the 8th FP focus on the following main areas:

1) the development and use of space applications meeting the goals of European public policy and the needs of European enterprises and citizens, including the needs in the areas of environment, development and global climate change;

2) the development of natural sciences such as physics, chemistry, biology, astronomy, medicine by supporting research carried out in space and in the conditions of space flight, thus gaining new knowledge and increasing the level of understanding of Czech scientific research; the support of research and development in technical sciences, such as material engineering, nanotechnology, optics, thermodynamics, energy sources, electronics and radio technology and with it the adoption of new technological procedures and methods and their use in industry practice

Create the conditions for the development of international cooperation by supporting networking and joint R&D teams with the participation of leading Czech and foreign research institutions.

The CR prefers reflecting these activities in a programme that includes research in the following specific areas:

- design and development of satellite experiments for the research of the Sun and space weather, the properties of the ionosphere and magnetosphere of the Earth and other bodies of the Solar System
- development of methods and experiments for the research of the biological and chemical composition of celestial bodies, in particular the Moon and Mars
- development of methods for studying the climatic parameters of the environment of the Earth (atmosphere, hydrosphere) using satellite systems
- development of methods and experimental equipment for the research of material properties, focusing on compact substances and substances sensitive to electromagnetic radiation
- development of a methodology for measuring elementary particles and the research of their detectors

For the support of scientific research, it is also important to create conditions for the technological development in equipment technology, including:

- new procedures for the designing and completion of electronic circuits, in particular regarding their miniaturisation
- development of optical materials and their processing with high precision requirements
- development of highly accurate and sensitive antenna systems working with gigahertz frequencies
- development of chemical processes resulting in the creation of substances with new energy, thermal, mechanical and electrical properties

- development of intelligent automated systems, focusing on the lowering of human operation requirements
- In accordance with the other areas of the 8th FP, astronautics is also an area of the development of computation technology and digital methods of data processing, including visualisation and three-dimensional simulations of observed phenomena.

In addition to the areas mentioned above, we recommend for the 8th FP and its calls for proposals a horizontal emphasis of:

1. Critical technologies
2. Strategic link with the areas of defence and security
3. Support of GMES and GNSS applications

QUESTIONS:

- How to support synergy and complementarity of space research projects of FP and ESA?
- Will there be a joint evaluation process of ESA and FP projects?
- How will be the balanced development of knowledge and skills among the member states secured? What mechanism will be used?

PRIORITIES FOR THE 8TH FRAMEWORK PROGRAMME IN THE THEMATIC AREA OF TRANSPORT

Strategies and visions of the CR for the 8th Framework programme of the EU

Framework programmes of the EU with the financial support of the European Commission are very important for the transport industry and research of both this country and Europe. Research in the area of transport cannot be efficient without strong international cooperation. Framework programmes support the development of international cooperation, increase the effectiveness of research activities and to a certain extent harmonise the national approaches to R&D in the individual EU member countries. The pooling of knowledge and R&D capacities and their gradual integration are among the important outputs of the FP. **For this reason, the Czech Republic supports further continuation of framework programmes similar to the 6th and 7th FP of the EU.**

For the prepared 8th Framework programme, it is necessary to retain and possibly increase the budgets of the given areas, with respect to their social importance, including the significant role of the aeronautic industry and aeronautics research in the EU. Because of the position and importance of air transport and its expected future development in the EU and the world, **the Czech Republic recommends including the "aeronautics" theme as a separate part of the 8th FP of the EU**.

In the sustainable land transport priority, the distribution of finances between **Level 1**[5] and **Level 2**[6] projects was never a problem. For this reason, the Czech Republic further supports a balanced financial distribution between the projects of level 1 and 2. The question remains whether these two levels will be defined in the 8th FP.

For the aeronautics priority, however, we recommend a **full review of level 3 project instruments**, to create instruments that are fully functional, similarly to the well-established instruments of Level 1 and Level 2. **Level 3 projects should have their own budget, allocated outside the total budget for the individual calls of the EU framework programme.**

Regarding project instruments, **the Czech Republic supports a balanced approach to implementing project instruments of the Level 1, Level 2 and Level 3 type in the 8th FP.**

PRIORITIES

While transport undoubtedly plays a positive role in increasing the prosperity and securing the mobility of EU citizens, **the negative impacts of transport on the elements of the environment** must also be evaluated. The Czech Republic has been focusing on this issue strongly, and therefore further supports R&D with the aim of reducing the negative impacts of transport on the environment and public health and fully identifies with the EU goals in this area.

In **transport infrastructure**, the Czech Republic supports R&D focused on decreasing its energy demand and analysing the influence of climate changes on the life cycle of transport infrastructure.

A very important part of the Czech Republic's engineering is the **production of transport vehicles**, which is on a very high level. The Czech Republic therefore supports R&D focused on the modernisation of vehicles for integrated transport systems, improving safety and the use of alternative and in particular renewable

[5] Level 1 is the general level, typically relating to three types of land transport. Project proposals may focus only on a part of the described theme or only one transport type.

[6] Level 2 is a specific level and its description is clear – the target to be reached is described, together with the solution procedure, including expected outputs. The theme must be fully covered in level 2.

energy sources, and also in relation to the lowering of travel time and increasing comfort.

Alternative energy sources

Czech R&D initiatives in the area of **alternative energy sources** in transport have been focusing on the support of the production and use of **biofuels** and other alternative fuels, the introduction of vehicles running on alternative fuels and the development of alternative propulsion systems.

The field of alternative fuels and propulsion is very broad, and will be the focus of intensive research in the upcoming period. The Czech Republic will support the following research agendas in this area:

- Research of common refinery processing of pure biofuels (plant oils) and crude oil fractions (hydrocracking, hydrogenation, catalytic cracking) with the aim of producing hydrocarbon fuel for combustion engines.
- Analysis of the possibilities of replacing first generation biofuels with the second generation and with technologies decreasing greenhouse gas emissions.
- Analysis of biomass sources in the CR and the methods of its use.
- Research of processing biomass to liquid hydrocarbon fuels. Pilot project for producing second generation biofuels. Selecting a technology.
- The impact of the implementation of alternative fuels and propulsion and other related changes on the refinery industry. Change in the role of refineries in producing and distributing engine fuels.
- Drafting a programme of a gradual introduction of highly concentrated mixtures of biofuels with fossil fuels and pure biofuels. Designing instruments for their broader use.
- Analysing the technological and economical options of producing engine oils by liquefying local lignite.
- Research of improving combustion processes in the engine, incl. hybridisation.
- Research of the optimisation of producing fuel mixtures, focusing on combinations of standard and alternative fuels.
- Research of non-combustible vehicle emissions.
- Research of the efficiency of energy management (electric vehicles, hybrid vehicles), using waste heat etc.
- Research and innovation of energy sources (batteries, fuel cells).

The use of **hydrogen** in transport seems very promising. Hydrogen can be used in all areas of transport (land, water, air and space). The use of hydrogen in automobile transport provides several advantages over electric vehicles: large range and short fuelling period. The combination of hydrogen and electric propulsion in a hybrid propulsion system presents considerable advantages. Research of the use of hydrogen in transport will focus on hydrogen production, storage and infrastructure, fuel cells and testing the dynamic properties of hydrogen propulsion vehicles. The position of the Czech Republic in this area is very good; a unique hybrid hydrogen bus named TriHybus was constructed and is in operation.

Electrification of transport will provide a significant contribution towards lowering the dependence on liquid, oil-based engine fuels. Operation of electric vehicles on a large scale can be expected after 2013, especially in cities with shorter travel distances. After 2012, a significant increase in the number of hybrid vehicles can be expected, with a combination of a combustion and electrical engines. Activities of the Czech Republic in this area (ČEZ programme) correspond to these trends entirely; for this reason, the Czech Republic fully supports programmes like the Green Cars Initiative, which was a part of the 7th framework programme.

Road transport

High use of the road infrastructure creates problems for its users in the form of congestions. Using **telematics and information instruments** will therefore become increasingly important in the future. For this reason, the Czech Republic fully supports R&D in this field.

A very significant aspect of the negative influences of transport remains the **high accident rate of road transport**. Even though in the recent years, there has been a very significant decrease, the current state still is not satisfactory. The Czech Republic therefore further supports R&D in this area, with the goal to decrease the number of fatal injuries in 2020 by 50% compared to 2010.

Railroad transport

In the area of **railroad transport**, research focused on the introduction of new solutions within the application of ERTMS (European Rail Traffic Management Systems); a strategy research agenda was designed with the aim of reaching railroad structure interoperability. Within this strategic research agenda, several specific selected problem areas were proposed, such as:

- Application of modern materials based on geopolymer composites for the repairs and restorations of railroad constructions made of concrete and reinforced concrete.

- Analysis of the degradation of track quality resulting from its interaction with railroad vehicles
- Defining an interface for the linking of on-board components of the ETSC and GSM-R systems
- Defining basic technical requirements for the detectors of irregularities in the driving quality of railroad vehicles (HABD) and determining a strategy of their implementation
- Determining the conditions for the use of composite brake blocks
- Introducing the recuperation of the braking energy of trains
- Testing and implementation of the installation of an auxiliary return wire along the wires on top of traction current pylons
- Interactive behaviour of the trolley line – pole system
- Using new diagnostic methods for track foundations
- New construction solutions for the track foundation of transitional areas near bridges
- Diagnostics of the dynamic effects in railroad switches
- Innovation and development of switch systems, for interoperability and competitiveness

For the next 10–15 years, in accordance with the strategic research agenda of the ERRAC European technological platform, the following agendas are proposed:

- Cost-efficient railroad infrastructure maintenance and maintenance-free railroad infrastructure,
- Limiting the costs for assessing the safety of railroad equipment,
- Unified procedures for testing safety equipment used for interoperability,
- Research of electromagnetic compatibility.

Combined transport

In the area of **combined transport**, the CR supports its development using progressive logistics approaches.

Aeronautics

Smaller projects of the **Level 1** type are important for the resolving of partial technological and research issues. In Level 1 projects, there is a relatively high representation of small industrial companies (SMEs), research centres and

universities. As previously, Level 1 type projects should include projects focusing on:

Breakthrough Technologies

and Pioneering Research, which can help significant technological breakthroughs in the future.

Larger integrated **Level 2** projects have a high added value for the aeronautics industry. In these projects, already developed technologies are further integrated and validated in complex functional units, often also with demonstrators simulating actual operational conditions. The participants of Level 2 projects include larger industrial companies as well as research institutions and universities.

In large **Level 3** projects, and in particular using the JU – Joint Undertaking and JTI – Joint Technology Initiative instruments, the focus is on pressing technological challenges with significant impact on the European community. Level 3 projects should focus only on areas where for some reason, market mechanisms failed and the European Union is forced to seek solutions on the PPP (Public Private Partnership) principle. The Czech Republic recommends for further projects more options of involving all EU countries and finding transparent mechanisms for the selection of partners with EC participation.

Strategic goals of the Czech Republic in the 8th FP for the area of **aeronautics** focus on the following main areas:

1) Strengthening EC support in the fields of General Aviation and Business Aviation, including regional air transport;
2) Securing adequate support from the EC for the development of international cooperation with key players of European aviation;
3) Strengthening the perception of aviation as a complex transport system, including both aircraft and land infrastructure and related services that make air transport possible.

The CR prefers for the future 8th FP and its working programmes to focus on these basic areas of aeronautics research:

Flight physics

Aerostructures

Aircraft avionics, systems and equipment

Propulsion

Flight mechanics

Integrated design and validation

Air traffic management

In addition to the areas mentioned above, we recommend stressing in the 8th FP and its calls for proposals the emphasis on developing technologies focusing on:

Improving cost efficiency of air transport systems

Efficient manufacturing technologies

Noise abatement

Safety and reliability

QUESTIONS:

- What consequences both for financing and management would have independent specific research program for aeronautics?
- Is Transport in 8RP recommended as a separate theme?
- Is it relevant to clasify project oulines into two levels (level 1 - generic, level 2 - specific), would it be advisable to introduce more levels?
- Is the amount of 3 mil€ as a point of division between small/medium and big project satisfactory, should another amount be fixed
- Should projects European Green Car Initiatives and similar and programme CIVITAS be continued in 8RP?

Ministry of Education, Youth and Sports (MEYS)

VERA – Committee for the ERA of MEYS