ELABORATION OF AREAS OF SPECIALIZATION IN THE SLOVAK REPUBLIC IN TERMS OF AVAILABLE SCIENTIFIC AND RESEARCH CAPACITIES IN COMPLIANCE WITH RIS3

- Material Research and Nanotechnologies
- Information-Communication Technologies
- Biotechnologies and Biomedicine
- Agriculture and the Environment Including Modern, Environmentally-Friendly Chemical Technologies
- Sustainable Energy Industry and Energy

2015
Elaboration of Individual Identified Areas of Slovak Specialization in Terms of Available Scientific and Research Capacities in Compliance with RIS3

The priorities for RIS 3 implementation for the period of 2014-2020 have been elaborated in five areas of specialization from the point of view of available research and development capacities in compliance with RIS3 with a link to the areas of economic specialization and perspective areas of specialization.

Material Research and Nanotechnologies

1. Title of Intent/Theme (material for calls/projects/programmes):
Research of Progressive Materials and Nanotechnology

Goals:
- Development of a research base targeted on the actual needs of Slovak industry (with a special emphasis on the automotive industry, mechanical engineering, chemical industry, electronic and electrical power industry, and the processing of ore resources and secondary raw materials) in order to enable higher innovation and added value in production resulting from own research and thus higher economic effect.
- Systematic development of human resources oriented on the technological needs of industry in the near future
- Systematic development of methodologies, skills and technological bases necessary for research, experimental development and production of progressive and innovative materials, their structures, technologies and diagnostic and analytic methods.

Projected outputs and plans for application and use in economic and social practice:
In general, the following research outputs are anticipated: new products or innovation of existing products bringing higher economic effectiveness, higher quality, added value, life span, more acceptable energy and ecological impacts and safer production, use and liquidation of products.
We expect new or innovated products in the sub-supply chain of automotive, mechanical engineering, the electric power industry, such as various construction parts, functional systems and fluid systems.
Enhancing effectiveness in the use of domestic raw materials – production of products with higher added value.
New principally innovative materials and their technologies with distinctive added value for introduction in production.
Development of new types of sensors for use in various areas.
Development of new materials serving as replacement for banned materials pursuant to REACH regulations.
Development of new materials for medicine – various types of media for medications or new types of bone replacements. For example: polymer coating for pancreatic islands for medication in the treatment of diabetes.
Development of new materials for daily use – new types of packaging. For example: biodegradable packaging, hydrophobic coating for packaging materials, etc.
New electro-isolating materials with a lower ecological burden in order to enhance the safety of
nuclear power plants.

**Projected research period:**
2015-2022

**Projected volume of funds in total:**

Anticipated costs for completing the assignments under priority area research and development in millions of Euro

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**Anticipated researchers and partners:**
Creating consortiums for individual R&D assignments will be the basis. Consortiums will incorporate not only research institutions, university and higher education institutions workplaces, but also entrepreneurial entities. The following institutions are already experienced in this area: Slovak Academy of Sciences, Slovak University of Technology Bratislava, University of PJŠ Košice, Technical University Košice, Comenius University Bratislava, Matador, a.s., Púčov, Prvá zváračská a.s. Bratislava, Geothermalanywhere a.s., Danubia Nanotech s.r.o., VUKI a.s. Bratislava, EVPÚ a.s. Nová Dubnica, VÚPaC a.s. Bratislava, VUSAPL Nitra, Centrum excelentnosti získavania a spracovania surovín SMZ a.s. Jelšava, Duslo a.s. Šaľa, VUCHT a.s., VÚP a.s., Fortischem a.s., VÚCHV a.s., Chemosvit a.s., ŽP VVC s.r.o. Podbrezová, VÚZ PI Bratislava, ŽP a.s. Podbrezová, ŽP Informatika s.r.o. Podbrezová, ŽP EKO QELET s.r.o. Podbrezová, CEIT a.s., Žilina, OMS, HAMELN Modra, Plastikársky klaster Nitra, VUTCh a.s., VIPO Partizánske.

**Information and Communication Technologies**

1. **Title of Intent/Theme (material for calls/projects/programmes):**
   **Data and Information Space and Its Use**

**Goals:**
The goal to be accomplished under the theme Data and Information Space and Its Use by 2020 lies in outcomes which shift knowledge, methods and instruments at a level that will create interest in their presentation, use (or even patenting) even in the developed countries of the European Union. An accompanying objective is to contribute to creating a supercritical mass in the relevant area by concentrating the capacities of crucial research workplaces and companies able to absorb results with innovative potential.

**Projected outputs and plans for application and use in economic and social practice:**
Creating a platform for the input of acquired data, data processing, acquisition of or access to data in order to create services will be the output of the theme Data and Information Space and Its Use through its first unit “Ecosystem for Information and Data Sharing and Using”.

**Projected research period:**
The projected period of time for the completion of this theme is 2014-2020. We expect the implementation will be through one large project “Ecosystem for Information and Data Sharing and Using”; it will contain several partial subprojects and the projected period for completion is 6 years. It is expected that research objectives will be achieved through a smaller number of larger sub-projects whose research teams will meaningfully unite the best experts in the Slovak Republic and will also include experts from other areas if necessary, and through several smaller sub-projects also for more specifically targeted themes.

A two-stage approach is expected in the case of larger projects. In stage 1, a narrower consortium of key workplaces would elaborate a detailed draft of the structure and orientation of the project in the course of 2 to 8 months. This would then be resolved by a wider consortium of workplaces in the course of 3 to 5 years upon public comment proceedings.

Projected volume of funds for solution in total:
The project includes the creation of an entire ecosystem for sharing and using information and data, including the creation of an information system for the data market. The expected costs for the completion of the first unit amount to approximately 35 mil. EUR and 15 mil. EUR each for units 2 and 3. The total expected volume of funds is 65 mil. EUR

Projected researchers and partners:
The consortium would be comprised of organizations representing the Ministry of Education, Science, Research and Sport of the SR, the Ministry of Economy of the SR, academic institutions and sector associations and unions.

For stage 1, we expect a consortium with the representation of CVTI, Slovak Business Agency, Comenius University Bratislava, Slovak University of Technology Bratislava, Technical University Košice, Technical University Žilina, Slovak Academy of Sciences, ITAS, Slovenská aliancia pre internetovú ekonomiku/Slovak Alliance for the Internet Economy, and ZEP

Planned Implementation Structure
Funding from various resources is planned for the implementation of the goals under this priority theme:

- Creating the state programme Data and Information Space and Its Use with thematic areas incorporating the three aforementioned units.
- Calls of the Slovak Research and Development Agency (APVV) oriented especially on units 2 and 3.
- Stimuli supporting start-ups and allowing access to certain data sources.
- Available EU funds.

2. Title of Intent/Theme (material for calls/projects/programmes):
  Internet of Things – Smart Internet (Smart Devices, Smart Applications, Smart Cities, …)

Goals:
- Strengthening the competitiveness of Slovak industry regarding the development, mastering and forming of the future generation internet which will gradually replace the current web, landlines and cellular networks and infrastructures of services, and which will enable links among the devices (Internet of Things) of many operators and domains, which will change the method of publicizing, accessing and using knowledge.
- Enabling the innovation of existing products and solutions of Slovak companies and creating new ones and thus supporting the development of the internet economy in Slovakia and the establishment of Slovak companies on the global market.
Extending and improving the quality of eGovernment services and utilization of ICT potential in the area of healthcare, education and culture.

Projected outputs and plans for application and use in economic and social practice:
Innovative solutions implemented in the form of the supply of new information services and innovative applications which will lead to the establishment of new innovative start-up companies will be the output. We expect that the outputs under this priority area will result in an increased GDP share of the ICT and information industry by 0.5% by 2020, the creation of at least 5 new SME in ICT and services a year starting from 2016 and increased employment in ICT by 5,000 jobs by 2020. ICT will contribute to an increase in internet business transactions as a result of improvements in the safety and credibility of internet transactions.

Projected research period:
The projected period of time for the completion of this theme is 2014-2020. A two-stage approach is expected. In stage 1, a narrower consortium of key workplaces from the university environment, the Slovak Academy of Sciences and companies would elaborate a detailed draft of the structure and orientation of projects in course of 2 to 8 months. This would then be resolved by a wider consortium of workplaces and relevant interested parties in the course of 3 to 5 years upon public comment proceedings.

Projected volume of funds for solution in total:
The average volume of funds necessary for the completion of each of the five specific units is 15 million Euro. The total volume for this theme is 75 million Euro.

Anticipated researchers and partners:
We anticipate the creation of consortiums for thematic units in which we expect, besides others, the participation of the following institutions: the Ministry of Education, Science, Research and Sport of the SR (organizations directly managed by the ministry, university scientific parks and excellence centres), the Ministry of Economy of the SR, the Ministry of Finance of the SR, academic institutions, sector unions and associations, the Slovak Academy of Sciences, and the most significant representatives of industries and non-profit organizations).
Stage 1 calls for consortiums with the representation of CVTI (Slovak Centre of Scientific and Technical Information), Slovak Business Agency, UK (Comenius University), STU (Slovak University of Technology), TUKE (Technical University Košice, Technical University Žilina, Technical University Žvolen, Slovak Academy of Sciences, ITAS, Slovenská aliancia pre internetovú ekonomiku (Slovak Alliance for the Internet Economy) and ZEP.

Planned implementation structure:
Funding from various resources is planned for the implementation of the goals under this priority theme:
1. Creating a state programme Smart Internet for Improving the Quality of Life and Development of Economy with thematic areas incorporating the three aforementioned units.
2. Calls of the Slovak Research and Development Agency (APVV) oriented especially on units 3, 4 and 5.
3. Stimuli supporting start-ups.

Title of Intent/Theme (material for calls/projects/programmes):
ICT in Resolving Research, Technological and Social Challenges
**Goals:**
The intent of R&D in this theme is to develop multiple usable methods and tools for existing small and medium-size enterprises enabling the creation of start-ups in specialized application areas and the development of their products on the outcomes of research. The aim is to boost competitiveness of existing Slovak SME in the European market and to establish new ones. Education, culture, healthcare and public administration will be the particular application areas regarding social challenges.

**Projected outputs and plans for application and use in economic and social practice:**
The following outputs can be expected in the individual application areas:
1. information and communication systems for material research and control systems for new production technologies of progressive materials and nanomaterials with substantially improved or completely new qualities and with added value enabling their assertion in global markets.
2. biomedical and biotechnological information, communication and control systems with significantly new added value enabling the improvement of the quality of life and controlled biotechnological processes.
3. competitive products with significantly new added value.
4. information and communication systems supporting new and the innovation of existing processes in the area of public administration/general government and healthcare, modern methods in the area of education and instruments for the mediation of culture via internet.

**Projected research period:**
The projected period of time for the completion of this theme is 2014-2020 and the period for researching individual projects under thematic areas is expected to be 1 to 5 years.

**Projected volume of funds for solution in total:**
It is expected that projects will be co-financed from that priority area of RIS3 which assigned the requirement for the need for a specific solution related to ICT. The preliminary estimate of the average volume of funds for each of thematic areas is 15 million Euro (in breakdown 10 million Euro from relevant thematic area and 5 million Euro from the funds of ICT priority). Thus, the need for funds from the ICK priority area is 30 million Euro (and we expect additional funding from other priority areas in the amount of 60 million Euro).

**Projected researchers and partners:**
We anticipate the creation of consortiums for thematic units which, in addition to others, will include: the Ministry of Education, Science, Research and Sport of the SR (organizations directly managed by the ministry, university scientific parks and excellence centres), the Ministry of Economy of the SR, the Ministry of Finance of the SR, the Ministry of Health of the Slovak Republic, academic institutions, sector unions and associations, the Slovak Academy of Sciences, and the most significant representatives of industries and non-profit organizations).
For stage 1 we plan consortiums with the representation of CVTI (Slovak Centre of Scientific and Technical Information), the Slovak Business Agency, UK (Comenius University), STU (Slovak University of Technology), TUKE (Technical University Košice, Technical University Žilina, Technical University Zvolen, Slovak Academy of Sciences, ITAS, Slovenská aliancia pre internetovú ekonomiku (Slovak Alliance for the Internet Economy) and ZEP.

**Planned implementation structure**
Funding from various resources is planned for implementation of the goals under this priority theme:
- Creating a state programme *ICT in resolving research, technological and social challenges* with thematic areas incorporating the six aforementioned units and the ICT area as such.
• Calls of the Slovak Research and Development Agency (APVV) oriented on the specific requirements of the aforementioned units as the ICT area as such.
• Available EU funds

4. **Title of Intent/Theme (material for calls/projects/programmes):**

   **Building of National Support ICT Infrastructure for Science, Research and Innovations**

**Goals:**
To build or to continue to develop an academic ICT infrastructure as the key infrastructure of science, research and education – to ensure the national implementation of a fully optical network as the basic strategic communication infrastructure of the educational sector, not only for the needs of education, but also for the area of research and science – linking all subjects under the ministry of education to this infrastructure and the provision of adequate support communication services for the educational sector and which will be suitably integrated with sector, European and other platforms.
Research institutions outside the state aid scheme (particularly, universities, the Slovak Academy of Sciences and sector research institutions, research and development institutions of the non-profit sector) and entrepreneurial entities when taking state aid rules into consideration are the target group.

**Projected outputs and plans for application and use in economic and social practice:**
Functional and motivating environment for the implementation of the smart specialization strategy.

**Projected research period:**
Two-stage approach is expected. In stage 1, a narrower consortium of key workplaces would elaborate a detailed draft of the structure and orientation of project(s). This would then be resolved by a wider consortium of workplaces in the course of 3 to 5 years upon public comment proceedings.

**Projected volume of funds for solution in total:**
The project incorporates the creation of the entire ICT ecosystem supporting science, research, introduction of innovations and transfer of technologies. Total expenses should amount to approximately 200 million EURO.

**Projected researchers and partners:**
We anticipate the creation of a consortium which will include: the Ministry of Education, Science, Research and Sport of the SR (organizations directly managed by the ministry, university scientific parks and excellence centres), the Ministry of Economy of the SR, the Ministry of Finance of the SR, academic institutions, sector unions and associations, the Slovak Academy of Sciences, and the most significant representatives of industries and non-profit organizations.

5. **Title of Intent/Theme (material for calls/projects/programmes):**

   **Central European Ecosystem for Sharing and Transfer of Knowledge and Support of Innovations in ICT**

**Goals:**
The aim is to build an ecosystem supporting the transfer of science and research outcomes into practice on the basis of an international conference and educational centre (similar to Schloss
Dagstuhl Centre) and university technological parks and excellence centres. The role of the ecosystem is to build (renew) communication among creators of new knowledge and the methods and those who can use them in the application areas for innovation and the enhancement of competitiveness. The mediation of the most recent knowledge, methods and best practices from foreign workplaces will also play a significant role.

**Projected outputs and plans for application and use in economic and social practice:**
Pilot implementation of an ecosystem for the sharing and transfer of knowledge and support of innovations. It will be possible to build a similar ecosystem for other areas (using the possibility of sharing for parts with independent specialization) upon acquiring experience in the area of ICT. The output will be the regular and organized transfer of knowledge and a built-up centre, which will be the bearer and organizer.

**Projected research period:**
The projected period of time for the completion of this theme is 2014 - 2020. A draft strategy, which will take 1 year, will be addressed in the project.

**Projected volume of funds for solution in total:**
The overall anticipated volume of funds is 50 million Euro, of which approximately 35 million Euro is expected from the Danube Strategy and structural funds.

**Projected researchers and partners:**
We anticipate the creation of a consortium including: the Ministry of Education, Science, Research and Sport of the SR (organizations directly managed by the ministry, university scientific parks and excellence centres), the Ministry of Economy of the SR, the Ministry of Finance of the SR, academic institutions, sector unions and associations, the Slovak Academy of Sciences, and the most significant representatives of industries and non-profit organizations).

**Biomedicine and Biotechnologies**

1. **Title of Intent/Theme (material for calls/projects/programmes):**
   
   *Research and Development of Modern and Effective Strategies for Prevention and Methods for Early Diagnostics and Modern Treatment of Socially Significant Types of Oncological Diseases*

   The orientation of bio-medicinal research on oncological issues has a long history in Slovakia. Preventing the occurrence of new oncological diseases and their early diagnostics and designing new effective methods at the national level is the priority theme. Knowledge acquired in this way should be transposed in practical therapeutic and diagnostic practice and in the new Slovak legislation with the aim to implement effective measures for preventing the occurrence of and reducing the incidence of oncological diseases in Slovakia. Building and finishing the building of clinical and experimental research centres in terms of staffing, premises and equipment on the grounds of oncological institutes with the involvement of clinical and research institutions is the method that should be applied in the implementation of this task.

2. **Title of Intent/Theme (material for calls/projects/programmes):**

   *Creating Effective Modern and Nationwide Methods for Prevention, Early Diagnostics and Treatment of Atherosclerosis and Ischaemic Heart Diseases in Order to Reduce Cardiovascular Morbidity and Mortality*
Research of atherosclerosis and ischaemic heart disease is for a long period of time one of the key themes for biomedical research in the European Union and globally. Themes of Horizon 2020 and RIS3 SK in biomedical research space are in many calls related to these issues and huge funds are spent for their resolving. Slovakia is the country with one of the most frequent incidence of these diseases. Therefore it is important so that cardiovascular research in Slovakia would be incorporated in the European research consortiums and so it would be closely coordinated and co-financed by EU projects as well. By creating of quality personnel and apparatus-related conditions this type of research may apply even for more significant financial grant support from the European Union.

3. Title of Intent/Theme (material for calls/projects/programmes):
   Research and Development of Modern Innovative Methods for Regeneration of Tissues and Organs with the Aim to Increase the Effectiveness of Treatment of Socially and Economically Serious Types of Diseases

Regeneration medicine and stem cell research represents the most intensively developing specialization in European and global biomedical research. Several research teams in Slovakia are partially caught up with this trend, however it needs to complete its efforts in terms of staffing and equipment. Significant clinical applications also occurred especially regarding the regeneration of skeletal tissues – bones and cartilage – but also regarding the regeneration of ischaemic complications with diabetes and the treatment of ischaemic tumours with the use of genetically modified adult stem cells, which is extremely interesting for European research.

4. Title of Intent/Theme (material for calls/projects/programmes):
   Molecular Mechanisms of Tissue Damage Caused by Ionising Radiation and Targeted Prevention

Although radiation by protons with their damage-reducing effect on surrounding healthy tissue is used in developed countries for the treatment of oncological diseases, in specific cases gamma radiation which when destroying the tumour also affects the surrounding tissues and causes damages to it, is still preferred. Therefore it is in the interest of countries which use proton radiation treatment to look for the mechanisms of such damage and targeted preventative treatment with the use of drugs/medication.

5. Title of Intent/Theme (material for calls/projects/programmes):
   Elimination of Persistent Contaminants in the Sediments of Bodies of Water (Streams and Reservoirs), in Water and Soil by Accelerated Electron Beams

Eliminating contaminants, even persistent contaminants, from the environment requires devices which are environmentally friendly, portable, reliable and effective. Accelerators producing energy electron beams which in a “cold way” effectively degrade even persistent substances and heavy metals from the environment are the most appropriate for these conditions.

6. Title of Intent/Theme (material for calls/projects/programmes):
   Effective and Environmentally Friendly Radiation Disinfection of Agricultural Products

Radiation disinfection of agricultural products is an attractive issue in the European Union because in addition to the fact that it is environmentally friendly, it has potential the aspect of economic benefits. The radiation elimination of bacteria and other microbiological contamination of agricultural products is highly effective, takes place in an ordinary environment free of any higher
temperatures, does not require any treatment of products before, during or after radiation. Agricultural products can be distributed to consumers immediately after disinfection.

7. *Title of Intent/Theme (material for calls/projects/programmes):* 

*New Methods for the Controlled Release of Biological Medications; New Methods in the Prevention and Treatment of Diseases by Natural Substances*

The joint long-term EU programme in the area of biomedicine offers excellent opportunities for development in Europe which transcends national barriers. Controlled medication release can be defined as techniques or methods which ensure the accessibility of active ingredients to the given target (transfer of the active ingredient from a reservoir to the designated surface) at a certain speed and duration in order to achieve the desired effect. Cell cultures are used for the testing of biologically active ingredients and medications as an alternative to tests on animals.

8. *Title of Intent/Theme (material for calls/projects/programmes):* 

*Preparation of Bio-Catalysts, Microbiological Metabolites and Biopolymers, New Remediation Technologies, Use of Biotechnologies in Waste Disposal*

Plastic is not inert. Regular plastic contains a large, sometimes prevailing amount of chemical additives (phthalates, phenols, etc.) which may affect the function of endocrine glands, contain carcinogens or have other toxic effects and may in principle (although only in small amounts) be released into the environment. Persistent organic pollutants do not disintegrate naturally, they accumulate in body tissues and may acts as carcinogens, mutagens and have other effects on our health. Biodegradable polymers have been the subject of research, development and production for several decades. The reasons for this type of production are the high growth of synthetic polymers (plastic, thermoplastic and elastomers) based on petrochemical raw materials (raw material reasons) on one hand, as well as very low biodegradability (environmental reasons), unsuitable hygienic qualities (health reasons), energy demands (economic reasons).

9. *Title of Intent/Theme (material for calls/projects/programmes):* 

*Biotechnological Production of Fuels, Bioenergy Industry Based on Industrial Biotechnology, Production of Bioethanol, Biobutanol, Methane and Hydrogen from Agricultural Waste*

The energy industry is one of the most important sectors in the national economy and has a direct impact on the economic growth of the country and its environment. To date, Member Countries have failed to prepare adequate systems for the support and production of biofuels; even suppliers of fuels have a negative attitude toward the use of bioethanol. However, the goals in biofuels are proposed for 2020: to achieve at least the level of 10% of use in comparison with other fuels and to do so in a legally binding way. The main materials for the production of bioethanol should be grains, while lingo-cellulose ethanol should eventually be produced from straw and waste. Bio-diesel fuel should be produced from rapeseed oil and in a smaller extent from soya oil and palm oil. Later, the second generation biofuels should be made by the ISCHER-TROP method from specially cultivated wood.

10. *Title of Intent/Theme (material for calls/projects/programmes):* 

*Research and Development of Medications Designated for the Proper Functioning*
of Immune System with the Use of Biologically Active Substances for Human Use – Support of Healthy Population

Biologically active substances of human origin should show higher activity, effectiveness and safety for ensuring the proper and effective functioning of immune system – immunology and oncology.

11. 

**Title of Intent/Theme (material for calls/projects/programmes):**

*Research and Development of Products on the Basis of Bacteriophages Designated for Human Use – Use of Progressive Technologies and Methods for the Elimination of Risk Factors with in Order to Enhance Quality, Safety and Processes and Products*

Development and research in the treatment of bacterial infections acquired in hospital and domestic environments, supplementing the range of products against an agent resistant to currently applied products – infections.

12. 

**Title of Intent/Theme (material for calls/projects/programmes):**

*Research and Development of Diagnostics and Medications Designated to Improve or Strengthen an Organism’s Immunity against Viral and Bacterial Agents with the Use of Top Modern Biotechnological Processes*

Development and research of diagnostics and medications designated to improve and strengthen an organism’s immunity against viral and bacterial diseases – strengthening diagnostic and therapeutic areas.

13. 

**Title of Intent/Theme (material for calls/projects/programmes):**

*Development and Research of Products Enhancing the Effectiveness of the Treatment of Allergic Diseases*

Development and research of medications enhancing the effectiveness of treatment of allergic diseases based on changes in their composition and forms of application – immunology.

**Agriculture and Environment**

1. 

**Title of Intent/Theme (material for calls/projects/programmes):**

*Sustainable and Ecological Systems for the Use and Renovation of Agricultural Land with Effective Crop and Livestock production, Production of Quality Food and Non-Food Products Cultivated from the Land*

**Goals:**

The framework goal is to improve the production of new knowledge and to strengthen innovations in order to achieve increased productivity in agriculture and to ensure the sustainable use of resources while reducing the pressure on the environment.

**Projected outputs and plans for application and use in economic and social practice:**

- Establishing land for production and non-production purposes in various soil and climatic conditions of Slovakia will contribute to optimizing land use from the economic and
environmental aspects but especially from the perspective of sustaining their favourable qualities for further generations.

- Use of economically effective and ecologically feasible systems of cultivating crops and livestock farming will enable Slovak farmers to succeed in the permanently changing economic and climatic conditions.
- Enhancing the effectiveness in the use of crop and livestock types, support for the economic stability and sustainability of agriculture with the simultaneous reduction of the environmental burden.
- Crop production also significantly addresses the problem of energy autarchy, i.e., the production of phytomass for various uses.
- Consumer demand is no longer oriented on quantity, but on quality or functioning, i.e., new characteristics which are determined by the content of certain substances beneficial for one’s health.
- Comprehensive analysis of the country management of selected river basins which will incorporate proposals for new arrangements of soil and its use.
- Comprehensive analysis of changes in agro-ecosystem services under the influence of degradation processes in sensible territories, proposals for its management and measures to reduce anticipated consequences of degradation processes.
- Innovations in the soil information system will incorporate an innovated soil information system, an innovated on-line system of pedology information for the expert public, an innovated set of basic soil maps including purpose oriented maps of selected soil qualities and guidelines for the evaluation and monitoring of soil-degradation processes and integrated river basin management.
- The use of economically effective and ecologically feasible systems of cultivating crops and livestock farming will enable Slovak farmers to succeed in the permanently changing economical and global (climatic) conditions.
- Required socio-economic studies will represent the knowledge basis for negotiating Slovakia’s capability in designing and amending agricultural policies of the European Union, including global policies.

**Projected research period:**

2015 - 2018

**Projected volume of funds in total:**

20 million Euro

**Projected researchers and partners:**

National Agricultural and Food Centre, Slovak University of Agriculture, University of Veterinary Medicine and Pharmacology Košice, National Forestry Centre, Slovak Academy of Sciences (institutes from the area of agriculture), Slovak University of Technology, Research Water Management Institute, Comenius University, Technical University Zvolen, University of Constantine Philosopher, University of Saints Cyril and Methodius, Slovak Agricultural and Food Chamber and agricultural enterprises and farms.

2.

**Title of Intent/Theme (material for calls/projects/programmes):**

*Sustainable Systems for the Use of Forests, Wood Processing and Wood Products*

**Goals:**
• Developing innovative solutions in order to improve and ensure sustainability in wooden biomass production as the most significant domestic raw material and carrying out the non-production functions of forests.
• Designing solutions for emission and waste elimination, adaptation of the climate and reduction of the environmental burden.
• Supporting the development of industrial technologies (green) with a minimum impact on environment biota and complementarity between industrial development and sustainability of the balance in the environment.
• Elaborating innovative methods for the sustainable development of the energy use of wooden biomass as one of the key renewable energy resources in the Slovak Republic.
• Designing smart technologies in wood processing and thus enabling a substantial increase in the effectiveness and competitiveness of production from domestic raw material resources.
• Designing an implementable strategy for the sustainable production, processing and use of wooden biomass in terms of the Slovak Republic with an emphasis on the needs of rural development and improving the environment and viability of forestry, wood processing and the use of renewable energy resources.
• Designing the possibilities for the alternative use of non-forest land for the production of wooden biomass.
• Designing methods/technological procedures in the recovery and re-use of wooden products according to their product category and chemical burden.
• Developing an expert system to support decision making when selecting the most suitable alternative for the recovery and re-use of wooden waste in terms of environmental, economic and sustainability issues that reflect the principle life cycle thinking.

**Projected outputs and plans for application and use in economic and social practice:**
The implementation of the proposed innovations in forest management will increase the productivity of forest ecosystems, and their health and resistance, which will create conditions for improving the delivery of the non-production functions of forests (such as water and soil conservation, recreation, biodiversity, etc.).
The use of less-productive and unused non-forest lands for the production of wooden biomass in suitable conditions will increase the production potential of the raw material in the Slovak Republic; it will also support job creation while improving the environment (soil, water, carbon sequestration, emissions).
The introduction of modern technologies in forest management will increase the economic effectiveness of the production activities in forest management, while the availability of wooden biomass for further use will be improved. Furthermore, the environmental burden and energy demand of production activities will be reduced, and occupational safety and health protection will be increased.
The development of effective methods for the production of energy and biofuels in terms of the SR (Slovak Republic) will enhance the energy self-sufficiency of regions and the state and fuel supply security. It will also lead to the reduction of greenhouse gases, the stabilization of fuel and energy prices, the support of job creation and the development of related economic activities.

**Projected research period:**
2015–2018

**Projected volume of funds in total:**
16.5 million Euro

**Projected researchers and partners:**
National Forestry Centre, National Agricultural and Food Centre, Research Institute of Paper and
3.

Title of Intent/Theme (material for calls/projects/programmes):

*Innovations and Modern Methods for Production and Control of Quality and Safe Food from Domestic Resources*

**Goals:**
The project’s strategic goals are to increase the production and competitiveness of Slovak food and food materials through effective use of science and research, and increase the production potential of agricultural primary production and free human potential in all Slovak regions. It also envisions the production of, quality, health supporting food, products and materials of primary agricultural production. Furthermore the project aims to create conditions for enhancing the level of recovery and re-use of secondary raw materials from agricultural and food primary production while increasing employment and revenues in rural areas.

**Projected outputs and plans for application and use in economic and social practice:**
- Elaborating a situation analysis in various small and medium sized food production enterprises to ensure the transition from checking products to the prevention of microbial contamination in food production.
- Elaborating a microbiological risk assessment for producers of traditional regional food.
- Elaboration of new highly sensitive, qualitative chemical, physical and chemical, molecular-biological methods oriented on rapid diagnostics of health and hygienic safety of food for the needs of inspection bodies.
- Specifying new functional products prepared by using innovative methods with production technology designs.
- Set of second generation methods for the molecular-biological quantitative analysis of allergens in food at low contamination levels.
- Set of methods for the molecular-biological identification of food components of vegetable origin, including their quantification in mixtures.
- Developing and applying analytical methods for establishing allochtonous and toxic substances in order to check their content in food materials and products, minimizing the creation and content of these substances in production processes and food storage.
- Developing and applying analytical methods in order to analyse natural and additive agents usable in the food industry.
- Building a database of analytical characteristics for a food databank (food nutrition quality), building of databases of selected analytical characteristics of food products as a tool for their identification and authentication.
- Ensuring consumer services in the form of laboratory tests and establishing selected analytical parameters according to individual requirements.
- Professional consulting for the food industry and state administration bodies oriented on control methods related to food quality and safety, elimination of toxic and risk agents and developing new food products.
- Research, development and production of new construction nodes, machinery and technologies and the development and production of optimal technological cycles for the recovery and re-use of organic waste according to actual requirements of the region and in compliance with the National Energy Strategy.

**Projected research period:**
Projected volume of funds in total:
€ 10 million

Projected researchers and partners:
National Agricultural and Food Centre, Slovak University of Technology Bratislava, Comenius University Bratislava, Slovak Academy of Sciences (institutes of agricultural and social sciences), Slovak University of Agriculture Nitra, University of Saints Cyril and Methodius Trnava, University of Veterinary Medicine and Pharmacology Košice, Dairy Research Institute Žilina, Slovak Agricultural and Food Chamber and small and medium-size enterprises in the area of agro-food industry, small producers of food (KKV-Union, Bryndziareň a syráreň Zvolenská Satina (Bryndza and Cheese maker).

Sustainable Energy Industry and Energies

1.

Title of Intent/Theme (material for calls/projects/programmes):
Allegro Applied Research Centre

Goals:
- building of the ALLEGRO Applied Research Centre
- research and development of active zone and primary circuit construction materials suitable for use in various operating situations under the conditions of high temperature, high neutron flow while taking into consideration the helium technology requirements.
- research and development of second circuit reactor materials, regeneration unit and hydrogen storage materials and materials with specific qualities for the broader use of outcomes in the energy and automotive industries.
- research and development of surface finishes of materials for specific and wider use in technical practice.
- research and development of materials for sensors for specific applications in reactor circuits, including the development of sensors for broader application in practice.
- research and development of material production technologies, including technologies for their combining with a specific consideration of the requirements for joint tightness through the use of helium.
- research and development of destructive and non-destructive methods of the industrial testing of reactor materials, components and nodes under simulated reactor working conditions with the possibility for the broader use of these methods.

Projected outputs and plans for application and use in economic and social practice:
- The ALLEGRO project represents a unique opportunity for Slovak science and research to focus their research, development and innovative activities on the established priorities of the new OP R&I and to maximize the effects of existing investments in science and research.
- The implementation of this project in Slovakia will positively affect the technical development and economy of Slovak research and production organizations in the course of the entire research period through project design and subsequently in the course of the production of reactor components.
- In upcoming decades, ALLEGRO will be the driving force for top research and technology in this region and provide an excellent opportunity for any industry working with high added value.
- Acquired know-how related to the building and operation of fast reactors will enable Slovakia to count itself among developed countries not only in the area of nuclear energy and will enable Slovak companies to participate in the building of new reactors in the EU and globally.
- Resolving the issue of the storage of spent nuclear fuel from nuclear power plants in Slovakia which would be used after re-processing as fuel for a new type of reactor.
- Marked decrease in the ecological burden from operation and a distinctive increase in effectiveness of nuclear facilities.
- Distinct increasing of 4th generation nuclear reactor safety in comparison to sodium-cooled reactors in critical situations.
- Potential ESFRI structure, unique in Slovakia.

**Projected research period:**
2015 - 2020

**Projected volume of funds in total:**
500 million EURO

**Projected researchers and partners:**
Slovak University of Technology, Comenius University, University Žilina, Technical University Košice, VUJE, a.s., University of Economics Bratislava, DECOM, a.s., Science and Research Centre, s.r.o., Welding Research Centre – Industrial Institute of the SR, Prvá zváračská, a.s., Electro-technical Research and Project Institute Nová Dubnica, a.s., ZTS Research and Development Institute in Košice, a.s., Železiarne (Iron Works) Podbrezová, a.s., Slovenské energetické strojárne, a.s. (Slovak Energy Machine Works), SYLEX, s. r. o.

CEA (Commissariat à l'énergie atomique et aux énergies alternatives) France
MTA-EK (Magyar Tudományos Akadémia Energiatudományi Kutatóközpont) Hungary
NCBJ (Narodowe Centrum Badań Jądrowych) Poland
ÚJV Řež, a.s. Czech Republic

Foreign partners will not be funded from the project budget but their contribution in the project will represent their share of the ALLEGRO reactor.

2. **Title of Intent/Theme (material for calls/projects/programmes):**

Enhancing Transition Capacity and Safety of Slovak Electricity Supply System

**Goals:**
The goal of this programme is the research, development and completion of systems and technologies for WAMS (Wide Area Monitoring System) and WAPS (Wide Area Protection System), implementing of a pilot project related to WAMS and WAPS exploitation in transmission systems and the use of PMU (Phasor Measurement Unit) as a basic means for the reliable new measurement of necessary parameters.

**Projected outputs and plans for application and use in economic and social practice:**
- Research and development of new WAxS communication and monitoring structures for electricity supply system control.
- WAxS systems architecture design for transmission systems.
• Creating computer models of electricity supply system for testing the qualities of WAxS systems using PMU equipment.
• Design and testing of complex models of electric networks for the verification of data transfer functioning from PMU, re-dispatching and re-configuration of electricity supply system.
• Design of legislation for the use of re-dispatching and re-configuration of networks with an impact on neighbouring systems.
• Analysis of the possible economic impacts of the re-dispatching and re-configuration of networks in selected situations in the system.

Projected research period:
2014 -2020

Projected volume of funds in total:
36 million EURO

Projected researchers and partners:
Slovak University of Technology, Comenius University Bratislava, University Žilina, Technical University Košice, IPSOFT, s.r.o., RELKO s.r.o., SIPRIN, s.r.o., ATOS, s.r.o., Siemens, s.r.o., ZSE, a.s SSE, a.s., VSE, a.s., Schrack Technik, s.r.o., MicroStep s.r.o., SEPS, a.s., ENEL – SE, a.s., ENFEI, s.r.o., Sféra, a.s.

3.
Title of Intent/Theme (material for calls/projects/programmes):
Research and Innovations Related to Smart Networks and Their Communication

Goals:
The goal of this programme is the research, design and development of necessary components and technologies of smart networks and suitable ICT for the communication and provision of data in the context of smart networks. Implementation of research pilot projects of smart networks.

Projected outputs and plans for application and use in economic and social practice:
• Research, design and development of suitable components and technologies of smart network building, their communication and control.
• Testing of components and technologies, designing a referential architecture for smart networks and smart measuring systems, communication systems ensuring interoperability, compatibility and the linkage of elements in the system through the selection of suitable technologies, standards and protocols for specific qualities of systems in the SR in compliance with Slovak legislation and EU standards.
• Design, testing and validation of possible technical and economic synergies between controlling smart networks, affecting consumption, local storage of energy and their overall integration with the use of ICT with limiting negative impacts on the environment and cost reductions.
• Comprehensive models and tools for the planning and operation of smart networks.
• Cost and benefit analysis models related to the development of smart networks and their components.
• Analysis and design of technical and economic solutions for the development of electro-mobility, possibilities for its regulation in electricity supply systems with the anticipated exploitation of decentralized production from RER (renewable energy resources),
• Use of new materials and technologies suitable for electro-mobility and designing tools ensuring data safety and personal data protection.
Projected research period:
2014 - 2020

Projected volume of funds in total:
49 million EURO

Projected researchers and partners:
Organizations that may participate this research and development project:
Slovak University of Technology, University Žilina, Technical University Košice, Slovak Academy of Sciences, ATOS s.r.o., Siemens s.r.o., ZSE, a.s., Západoslovenská distribučná, a.s., VSE, a.s., Východoslovenská Distribučná, a.s., SSE, a.s., SSE-Distribúcia, a.s., Schrack Technik, s.r.o., Greenway Technologies, s.r.o., ENFEI s.r.o., MicroStep HDO s.r.o., SE, a.s., SEPS, a.s., Sféra, a.s., OKTE a.s., Energotel a.s., ANDIS s.r.o, Elbatex sk s.r.o., EVPU, a.s., SPU v Nitre