Montenegro
Ministry of Science

>BULLETIN_

OF THE MINISTRY OF SCIENCE FOR 2017

CONTENTS

INTERNATIONAL INSTITUTE IN SOUTH EAST EUROPE – INITIATIVE FOR THE SCIENTIFIC PROGRESS OF THE REGION

In early 2017, the Ministry of Science launched the Initiative for the establishment of a large international scientific and technological institute for sustainable technologies in the region of South East Europe. In the next few months, this initiative has placed Montenegro in the focus of interest of the scientific, as well as of political public. Proposed by Professor Herwig Schopper, former Director General of CERN, the Initiative made progress quickly and attracted the attention of the countries of the region that recognized the economic, social and political benefits of this project, as well as its potential to transform the region, boost economic development, increase the standard of living and contribute to reduction of unemployment, especially with regard to young people. This project, based on state-of-the-art technologies, would enable research at a top level which would reduce the talent brain drain, one of the biggest problems of the region. At the same time, the Western Balkans would significantly improve research and scientific capacity and become competitive to the rest of Europe. The new institute would be an attractive place for the best experts from different disciplines and would represent one of the most beautiful examples of science for society.

Two commissions comprised of globally renowned scientists, directors of prestigious research institutions such as MAX IV – Lund in Sweden, CNAO-Pavia in Italy, HIT – Heidelberg, Germany, CERN and others, worked intensively on conceptual solutions for the two options of the institute: 4th generation Synchrotron Radiation Light Source, which would allow a wide spectrum of research with numerous applications in the industry, and Facility for Tumour Hadron Therapy and Biomedical Research with Protons and Heavy Ions. The chairman of the commission that worked on the conceptual solution for the first option of the institute was Dr. Dieter Einfield, former technical director of SESAME and ALBA projects, while the chairman for the second option of the institute was Prof. Ugo Amaldi, Founder and President of the TERA Foundation. The conceptual solutions were officially presented to the scientific and political community for the first time at the Scientific Forum in Trieste on 25-26 January 2018.

Hadron cancer therapy is today the most modern and most successful method for treating a large number of cancer diseases. With the construction of the Institute, this method would be available to all citizens of the region. What also makes the project unique is that 50 percent of its operation time could be devoted to researcher, for which there is a great need today, with no scientific institutes currently enabling it to this extent. About 1,000 researchers would have the opportunity to work on the project, and the number of patients to be treated covers the needs of a territory of about 20 million inhabitants.

Such a scientific infrastructure would inevitably launch a new cycle of development of our economy, lead to the scientific and technological recovery of the region, and represent an important pillar of the knowledge economy.

The training of researchers, scientists and technical personnel will begin already in 2018, thanks to the donation provided by the International Atomic Energy Agency. At the moment, our region does not have enough expertise to manage such projects, so training of future experts has to commence as soon as possible.

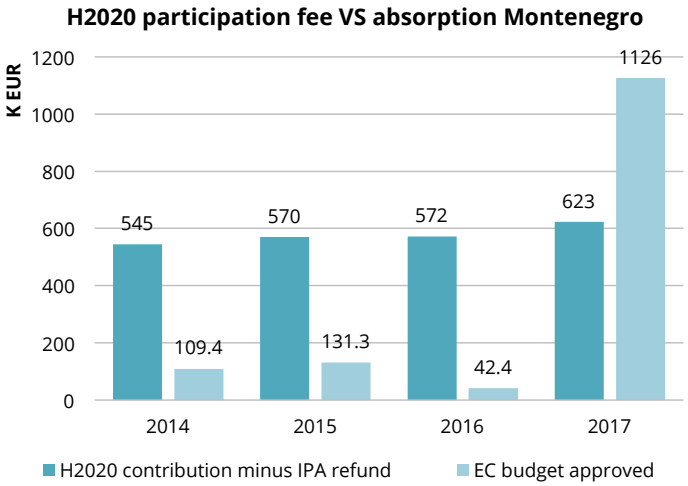
The apex of the Initiative in 2017 was the official signing of the Declaration in CERN on 25 October, by eight countries: Slovenia, Serbia, Bosnia and Herzegovina, Macedonia, Kosovo, Albania and Bulgaria, while Croatia and Greece assumed the status of observer countries. With this act, the Initiative has been transformed into a regional project, ready for future development phases.

BECOMING PART OF EUROPEAN RESEARCH AREA

STRENGTHENED PARTICIPATION OF MONTENEGRO IN **HORIZON 2020**

Montenegro joined the EU Framework Programme for Research and Innovation – Horizon 2020 in 2014. This was a continuation of our country's full participation in the European Research Area, as an ideal of free movement of people, knowledge and ideas within the European Union and the associated countries. Namely, our researchers have had the opportunity to participate fully in collaborative research projects financed from the joint budget since 2008, when our country joined the Seventh Framework Programme – FP7.

Due to certain processes in the system of higher education and science during the first three years of the H2020 programme, Montenegro did not achieve good results in this period, which caused great concern for Minister Sanja Damjanović. In this context, several rounds of consultations with counterparts from other countries were made and technical assistance within the TAIEX programme was utilized, so that a plan was made to set up a support system to enhance participation in the H2020 programme. A system of national contact points was reorganized through a more focused and smaller team of experienced employees, a series of information events, meetings and presentations were organized, and the time for intensive administrative support during the preparation of project applications was provided. At the same time, ties were strengthened with the European Commission in terms of regular presence at meetings and activation of participation in the projects of the Network of European National Contact Points. The IPA Human Resources Development Project made a strong impact on the capacities of researchers and managers through participation in intensive trainings with experienced lecturers from abroad. In parallel, the effects of internationalization, i.e. direct contacts with leading research teams in several areas, have al-



Source: EC – e-CORDA, extraction 4 December 2017

ready produced visible results in terms of new applications for projects under Horizon 2020.

Achieving very active participation in this EU programme is one of the important goals of the Ministry of Science in the coming period. Being part of the European Research Area in a full sense would imply having much more researchers and research institutions in Montenegro open to the world, the social community and the economy, as well as having science that is more responsive to the needs of citizens and the environment and which leads the creation of innovations in close contact with the economy. We intend to work decisively towards this goal.

>> PROJECT: **IMPULSE**

Project leader in Montenegro:
Dr Med, PhD Lidija Injac

IMPULSE aims to enable the development of effective healthcare for patients with severe mental illness, implementing an intervention model of DIALOG +, which is based on scientific evidence, is easily implemented and creates savings in the healthcare system. The intervention is supported by technology and is based on communication focusing on the patient, the quality of life research and the therapy finding solutions to the problem. The IMPULSE project will formulate a contextually appropriate approach and optimize the implementation of the intervention method in different healthcare systems, examining at the same time how local, organizational and national factors influence the implementation, sustainability and economic costs. This process will generate new knowledge on how to best develop and organize the healthcare of mental patients in the community in middle and low-income countries through the implementation of effective and generic interventions. A series of activities will be undertaken to publish the results of the project and thus maximize the impact of the research. This will include the transfer of findings into national implementation and policy guidelines in each country. The project proponent in Montenegro is the Clinical Centre of Montenegro, and the coordinator of the European project is Queen Mary University of London.

>> PROJECT: **CROSSBOW**

Project leaders in Montenegro:
MsC Biljana Ivanović, CGES (Montenegrin Electric Transmission System) and Prof. dr Saša Mujović, ETF (Faculty of Electrical Engineering)

Crossbow will propose a shared use of resources to encourage cross-border management of variable renewable energies and storage units, enabling a high level of clean energy entry on the market, and reducing operational costs while boosting economic benefits.
The results will be evaluated by eight transmission providers in Eastern Europe, grouped in clusters. Each of the project results will be evaluated in at least three countries, demonstrating the solutions offered by Crossbow for transnational issues with which electricity transmission companies are confronted. The proponent of the project in Montenegro is the Montenegrin Electric Transmission System, and thanks to a call of the Ministry of Science, the Faculty of Electrical Engineering of the University of Montenegro has subsequently joined the consortium. The European Project Coordinator is ETRA Investigacion y Desarrollo SA from Spain, and research institutions from Great Britain, Austria, Greece and Eastern European countries are involved.

>> INTERNATIONALIZATION PROGRAMME
CO-OPERATION WITH THE BEST EUROPEAN INSTITUTES

The internationalization programme, implying membership in large infrastructures, is one of the new measures of the Ministry of Science that aims to involve researchers from Montenegro in international collaborations within renowned scientific institutes in Europe (CERN, EMBL, EMBO, ESA – members of EIRO Forum as well as GSI- FAIR).

In July 2017, the Prime Minister of Montenegro Duško Marković signed a Memorandum of Understanding between the Government of Montenegro and CERN, enabling our country to become **a full member of one of the largest projects in CERN, the CMS Experiment (The Compact Muon Solenoid)**. Thanks to the availability of CERN data, this has enabled our scientists to conduct research directly from their home institutions, as well as to participate in all meetings via video conferencing, working directly with eminent scientists from all over the world.

"By signing this Memorandum, we create the prerequisites to be able to use all the scientific potential and knowledge of renowned scientists around the world to train our researchers and to contribute to the development of the Montenegrin science", the Prime Minister said after the signing of the Memorandum.

If the first decades of the 20th century were the years of chemistry, the 50s and 60s the years of physics, and late 20th century the era of IT technology, the 21st century is without a doubt the age of biotechnology and molecular biology, which are expected to make major breakthroughs in the coming years.

Accordingly, a plan of activities of the Ministry of Science has been created, and in **November Montenegro has become a full member of the European Molecular Biology Organization (EMBO) and the European Molecular Biology Laboratory (EMBL)**. Through this networking, Montenegrin scientists have gained access to all the resources of these two prestigious organizations, with the open possibility of direct contact and co-operation with the world's major teams in these areas.

The professional development and further education of our young experts (graduate, master, doctoral and postdoctoral students) through these memberships will give them the opportunity to realize their potential and, hopefully, raise the level of research in these areas in Montenegro, as well as to contribute to future discoveries and achievements as members of international research teams.

Although the very process of achieving the benefits of membership in such prestigious organizations is very complex and competitive, we are sure that our young experts will use these opportunities, as they always did when they were given similar chances in the past, and that we will very soon be proud of most of them as the best promoters of our country. There are no borders for science in terms of prejudice based on national or social origin, and therefore science unconditionally creates bridges and connects people, regions and continents, while simultaneously having the ability to pull the economy forward and provide better living conditions for entire countries and regions.

Montenegro is currently implementing a number of activities to establish co-operation with **the European Space Agency (ESA)** and in the course of 2018 we expect institutional linking and development of joint projects.

>> MEETING WITH MONTENEGRIN DIASPORA SCIENTISTS

The Economic Conference – Montenegro 2017 "Challenges on the Road to the European Union" was an opportunity for the Minister of Science Sanja Damjanović to meet and become familiar with the work of Montenegrin diaspora scientists with a view to establishing future co-operation. Forty scientists and researchers currently working in the US, UK, France and other European countries have accepted the invitation of the Ministry of Science and participated in a two-day meeting attended by about 500 representatives of governments, the business community, scientific and professional public from the region of Southeast Europe and beyond.
In an open discussion, the Minister urged diaspora scientists to actively participate and point out ways in which the effectiveness of state measures can be increased, as well as to propose concrete ventures based on their experience.

Prof. Nebojša Nakićenović, professor emeritus

and an expert in the field of history of technology, energy economics and sustainable development, visited the Ministry of Science in September, with a view to providing guidelines for further development of the Smart Specialization Strategy of Montenegro. Representatives of the Ministry of Science, the Ministry of Economy and the University of Montenegro expressed great satisfaction with the opportunity to meet the renowned scientist, originally from Herceg Novi, Deputy Chief Executive Officer of the International Institute for Applied Systems Analysis (IIASA) in Vienna, expressing the need for his further expert assistance to Montenegro.

>> EU SUPPORT TO SCIENCE DEVELOPMENT IN MONTENEGRO

MEETING OF THE MINISTER WITH COMMISSIONER CARLOS MOEDAS

In May, Minister of Science Sanja Damjanović met in Brussels with the European Commissioner for Research, Science and Innovation, Carlos Moedas, who gave full support to the regional initiative for establishing a new institute – a large scientific infrastructure. During the discussion, it was assessed that the European Commission was looking for exactly such projects, concrete scientific steps that would revitalize the region of the Western Balkans.

During the meeting with Commissioner Moedas, the Minister discussed ways to achieve progress in the field of science and research in Montenegro, the establishment of new instruments and initiatives that would strengthen the Montenegrin scientific research system, as well as open new opportunities for Montenegrin researchers.

>> ON CO-OPERATION WITH IAEA AT THE ANNUAL CONFERENCE

In September, the Minister of Science led the delegation of Montenegro at the 61st regular session of the IAEA General Conference, where she addressed the delegates of the member states. The Minister especially emphasized the importance for Montenegro of the co-operation exercised so far in the priority areas, reflected in the concrete support to the country through the procurement of capital equipment for institutions, as well as through training of personnel in renowned foreign institutions / laboratories. The minister met with the general director of the Agency, HE Yukiya Amano, when the support of the Agency to the new Initiative was expressed, which will be realised through dedicated funds for the training of experts. On this occasion, the invitation to the representatives of IAEA to participate at the Scientific Forum in Trieste was accepted.

>> STEERING PLATFORM ON RESEARCH AND INNOVATION **FOR WESTERN BALKANS**

At the invitation of the European Commission – Directorate-General for Research and Innovation, Minister of Science Sanja Damjanović participated in the Ministerial Meeting of the Steering Platform on Research and Innovation for Western Balkans, held on 27-29 September in Belgrade.
During the meeting, the ministers of the region noted that the weaknesses in scientific and innovation systems in the countries of the region, previously presented by expert Lisa Cowey, as results of a conducted study, could be removed by the implementation of the International Institute for Sustainable Technologies in South East Europe.

ECONOMIC CONFERENCE – MONTENEGRO 2017: **SCIENCE AS A PROPONENT OF ECONOMIC DEVELOPMENT**

Regional Economic Conference – Montenegro 2017, organized by the Chamber of Economy of Montenegro in co-operation with the Ministry of Science, gathered about 500 representatives of governments, business community, reputable scientific and professional public from Southeast Europe.
In the two-day sessions, the panel participants have attempted to define the challenges of Montenegro on the path to competitiveness and innovation, measures to strengthen scientific capacities through research, as well as ensuring synergy between science and the economy. Also, issues such as the benefits of investing in research have been raised, as well as what a country can do to encourage research in enterprises, and how internationalization can contribute to improving competitiveness.

In her presentation, Minister Damjanović has pointed out that numerous econometric models show that the increase in spending on research and development causes GDP growth, which has been confirmed in 28 countries of the European Union in the period from 2002 to 2012. In addition, companies investing in research increase their sales, and return rates are 10-15 percent, sometimes even higher. The task of the state is therefore to involve stakeholders, support the launch of research in enterprises, and to provide supportive conditions, such as tax incentives for establishing start-up companies.
In terms of enhancing competitiveness, the panelists have assessed that it is necessary to turn to internationalization, strategic international networking through EU programmes, large international infrastructures, and our people in the diaspora, all with a view to creating an environment that attracts foreign investment.
Minister Damjanović urged our diaspora scientists to actively participate and point out ways in which the effectiveness of state measures can be increased, as well as to propose concrete ventures based on their experience.

>> BETTER INTEGRATION AND OPENNESS OF MONTENEGRIN SCIENCE

NEW STRATEGY OF SCIENTIFIC RESEARCH ACTIVITIES PRESENTED

The new Strategy of Scientific Research Activities 2017–2021 (SSRA), adopted by the Government in late 2017, brings a new, refreshed strategic approach to development of scientific research activity in the country.

In the medium term, the new national strategic path should provide the strengthening of research capacities, connecting the scientific research community with contemporary European and world scientific tendencies and linking science and the economy, i.e. enabling science to open new development paths. In the drafting process, comparative practice was analysed and extensive consultations were carried out with the scientific research community, while the Minister herself actively participated in the development of the document, along with an expert group composed of prominent domestic and experts from the diaspora with rich academic and work experience at prestigious European scientific institutions.

DEVELOPMENT OF HUMAN RESOURCES AND RESEARCH CAPACITIES

Human resources and research capacities have been identified in the SSRA as the first strategic goal, given that they form the foundation of scientific research activity. Montenegro already has a developed academic community within four universities and a number of independent faculty units, and has a respectable number of individuals with doctoral degree. However, the fact that university staff is overburdened with teaching duties has already been recognized. That is why a number of instruments have been envisaged for the affirmation of the *research profession* and the generation of a scientific research critical mass capable of integrating into international, innovative and commercial research flows. In the coming period, the regulatory framework will be improved in order to precisely define and introduce the profession of a researcher at universities. Support will be provided for the employment of PhD-s and doctoral students, and special instruments are envisaged for fostering excellence and networking through support to centres of excellence and scientific research projects. The focus will be on the young talents in science, with the aim of training them for scientific work at a world-class level, but also to prevent them from leaving the country in search of better living and working conditions. Also, the improvement of the national scientific research commu-

nity is intended to be achieved through better integration of the Montenegrin scientific diaspora and persons without academic titles, i.e. inventors, in collaborative research projects.

The support will focus on the young talents in science, with the aim of training them for scientific work at a world-class level, but also to prevent them from leaving the country in search of better living and working conditions.

IMPROVING INTERNATIONAL CO-OPERATION AND NETWORKING

The second strategic goal is developing international co-operation in order to improve the quality and increase the competitiveness of national scientific research activities. In the past period, progress has been made in terms of enabling access to EU funds whose financial resources incomparably exceed the national sources, as well as in terms of access to a number of programmes (COST, etc.), which provide access to EU projects through networking with partners from abroad. However, the created chances have been used insufficiently – for example, in the first three years of participating in the EU research and innovation programme – HORIZON 2020, Montenegro managed to achieve a return of only 10% of the investment. Therefore, SSRA has envisaged the establishment of the *National Horizon 2020 Office*, which should provide the necessary administrative support to local science teams. Already in the first year of restructuring the support system, significant breakthroughs have been achieved. The state will also continue to implement its integration policy, through memberships or projects, with a number of prestigious international research centres, such as CERN, the *European Molecular Biology Laboratory* (EMBL), the *European Space Agency* (ESA) and others.

When it comes to facilitating access to modern scientific research literature and equipment, a number of instruments have been envisaged that should lead to improvement, through the policy of the so-called *open access*, promoted by the European Union.

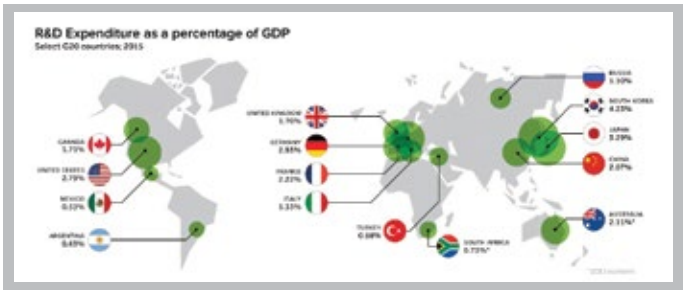
STRENGTHENING SYNERGY BETWEEN SCIENCE AND THE ECONOMY

The guiding idea of the new Strategy is to stimulate and improve domestic scientific research capacities by consolidating supported projects, because modern science and economics require serious investments in order to obtain new products and services that are competitive on the national, regional and world markets.

The last and equally important goal of the SSRA is the need to strengthen the links between science and the economy, as well as to better focus scientific activity on practical tasks. Efforts that have already been invested in the establishment of specialized scientific research and innovation infrastructures in the form of the *Innovation and Entrepreneurship Centre "Tehnopolis" – Nikšić* and the Centre of Excellence in Bioinformatics (BIO-ICT) will continue in order for them to achieve their full purpose, successful operation and self-sustainability. By the end of 2021, through the partnership with the University of Montenegro, the construction and start of operation of the first *Science and Technology Park* (STP), as a centre for networking and collaboration of about 50 small and medium-sized high-tech enterprises, is planned in Podgorica. In addition, the establishment of one or more *technology transfer centres* is envisaged to enable an active channel of communication between science and the economy. The introduction of stimulative measures of fiscal and customs policy has also been planned in order to create a favourable environment for growth and development of start-up companies, i.e. new business entities operating in the sphere of new high technology with the possibility of rapid growth. It is also planned to improve the protection of intellectual property rights.

Acknowledgement for the article, **Nina Radulović PhD**
Coordinator of the Working Group for Drafting the SSRA

One of the major measures under this goal is to facilitate the availability of large research infrastructures within the region, which is already being implemented through the Initiative for the Establishment of the International Institute for Sustainable Technologies in South East Europe (with the "Science for Peace" mission), where Montenegro is not only a participant as a regional partner, but also its initiator and leader.



>> INCREASED BUDGET FOR SCIENCE IN 2018

Thanks to the results achieved in 2017, the Government of Montenegro approved an increase of 64% in the budget of the Ministry of Science for 2018 compared to 2017. Of the total amount that includes the administrative costs of the Ministry's operation, the funds for beneficiaries (including membership fees in international organizations) have increased by 79% compared to 2017.

- Funds available to beneficiaries in 2017: EUR 2.26 million
- Funds available to beneficiaries in 2018: EUR 4.05 million

It should be noted that additional funds from the World Bank loan were also available to the beneficiaries in 2017, in the amount of EUR 775,000 for the HERIC programme. This programme will end in 2018, when the remaining amount of around EUR 790,000 will be spent from this source. Given the completion of the HERIC programme, it is necessary to increase the regular budget of the Ministry of Science and the use of IPA funds in order for the total spending to grow because state spending on research and development has a leverage effect on total R&D expenditure in the country, which includes the business sector. As is well known, the European Union aspires to spending 3% of gross domestic product on research and development.

>> PREPARATION OF THE SMART SPECIALIZATION STRATEGY IN MONTENEGRO

Smart specialization is a concept adopted by the European Union to ensure regional development based on innovation and synergy of diversity. Key features of smart specialization are: stimulating innovation through entrepreneurship, modernization and adaptation; risk taking in adopting innovative solutions for public administration; strategic technological diversification in the areas of relative strengths and potentials; increasing diversification by promoting new relationships, synergy and spillover effects (see Philip McCann (2012)).

Preparation of the Smart Specialization Strategy (S3) is a task of the Ministry of Science. It is a document that will determine the strategic direction of development of Montenegro in the fields of research and innovation in order for the limited resources of our state for activities in this area to be used rationally, in

accordance with Montenegrin specificities and potentials. Smart specialization aims to identify and select a limited number of priority areas for knowledge-based investment. S3 will also enable the development of new sectoral areas or industries by investing in research and innovation in areas that contain strategic potential in each of the European regions or countries.

The Joint Research Centre, Directorate-General of the European Commission, has supported the development of S3 in our country since May 2017. Montenegro is also involved in the work of the S3 Platform, which provides information, scientific and professional advice to decision-makers to establish and implement their smart specialization strategies.

We have included all the stakeholders from the innovation process in drafting the Strategy: decision-makers, universities, research institutions, small and medium-sized enterprises, etc. One of the most important steps in the production of S3, which is currently being implemented, is the process of mapping the economic, scientific and innovative potential of Montenegro. After the mapping process, in March 2018, we will start with the Entrepreneurial Discovery Process (EDP), which implies involving businesses and clusters in preparing S3, i.e. defining thematic and sub-thematic areas for which it is estimated that they can achieve the highest added value and contribute the most to increasing the competitiveness of the economy of our country.

Montenegro will adopt the Smart Specialization Strategy by the end of 2018. The document will present the basis for further applications for EU funds in the field of research, development and innovation.

>> NEW MEMBERS OF THE COUNCIL FOR SCIENTIFIC RESEARCH ACTIVITY

The new composition of the Council for Scientific Research Activity was determined on 28 July 2017. The members of the Council are: PhD Sanja Damjanović, Minister of Science, academician Petar Vukoslavčević, Prof. Saša Mujović, Prof. Vesna Maraš, PhD Elvir Zvrko, Prof. Gordana Đurović, PhD Nina Radulović, PhD Anđela Jakšić-Stojanović and Ms. Lidija Rmuš.

>> DEVELOPMENT OF INNOVATION INFRASTRUCTURE

Tehnopolis, Innovation and Entrepreneurship Centre in Nikšić and an important project of the Ministry of Science in the area of connecting science and the economy marked the first year of work. Significant results have been achieved – the intensive promotion of entrepreneurial culture in the city and the region, the first tenant cycle and a renewed call for services to new enterprises, several EU projects approved for important development initiatives, a lot of ideas how to proceed.

The central unit of the Science and Technology Park in Podgorica was defined in 2017, through a decision of the Government on the re-purposing of a building within the University of Montenegro campus (the so-called Building of Three Faculties). The Ministry and the University will intensively work on this project in 2018 and beyond, and the use of EU pre-accession funds is planned for putting this important segment of the organizational structure of the national innovation system into function.

>> INSTRUMENT FOR THE DEVELOPMENT OF SCIENCE AND INNOVATION POLICIES

Following the recommendation of the European Commission, in September 2017, the Ministry of Science applied for the use of the Policy Support Facility, an instrument established by Commissioner Carlos Moedas for all Member States and candidate countries in order for scientific and innovation systems to be developed in accordance with strategic objectives of the EU. Support was approved and in 2018 the following project will be implemented: Development of the legislative framework and ecosystem support model for start-ups in Montenegro.

>> EU PROGRAMME TAIEX FOR THE MINISTRY OF SCIENCE

In 2017, the Ministry of Science used two TAIEX support missions. In February, an expert mission was conducted with the participation of Dr. Nicholas Sammut, an expert from Malta. Dr. Sammut had the opportunity to transfer his great experience in the field of European integrations to the Ministry of Science employees as well as to colleagues from other government departments, especially when it comes to developing the Smart Specialization Strategy (S3) and strengthening the support system for our country's participation in the Horizon 2020 programme. Moreover, Mr. Sammut continued to provide generous support to the Ministry of Science beyond the scope of this expert mission and has largely contributed to the success achieved by the Ministry of Science in the past year.

In October, the Ministry of Science and Tehnopolis organized a two-day workshop in Nikšić, with the support of the EU TAIEX programme, on the establishment of an innovation ecosystem in Montenegro. The lecturers were Mr. Domen Bole and Mr. Iztok Lesjak from the Technology Park Ljubljana, as well as Prof. Diana Kopeva from the University of National and World Economy in Bulgaria. The lecturers shared their experience and knowledge of the best EU practices in creating a favourable environment and organizational structure for innovation development. The concept of co-creation in the design of innovation support policies and instruments was also presented, which is based on the Quadruple Helix model and the LEAN methodology.

In addition to these considerations, case studies were presented of communities in Slovenia – Technology Park Ljubljana, and co-working spaces in Jesenice and Kamnik. These examples indicate the manner in which the elements of a system are integrated into a comprehensive and functional ecosystem, which then becomes a development generator for the entire city, region, and the state as a whole. Technology Park Ljubljana and its development since 1994 to date has been recognized by the EU as one of the 20 best practice examples in Europe. After several years of successful functioning of the innovation ecosystem, more than EUR 100 million were invested in start-ups in Slovenia only last year, of which only 5% of national investments. In addition to the mechanisms for developing the start-ups, other services provided by the Park were also presented, such as B2B (business to business) networking of Slovenian companies with foreign ones, where Slovenia is very successful, with a significant number of its small, technologically advanced companies now selling their products to large markets such as China, India, Iran, Iraq and Israel. Technology Park Ljubljana also transfers its knowledge to many other centres in the region and in Europe.

>> DEFINITIONS OF RESEARCH AND EXPERIMENTAL DEVELOPMENT, FRASCATI 2015

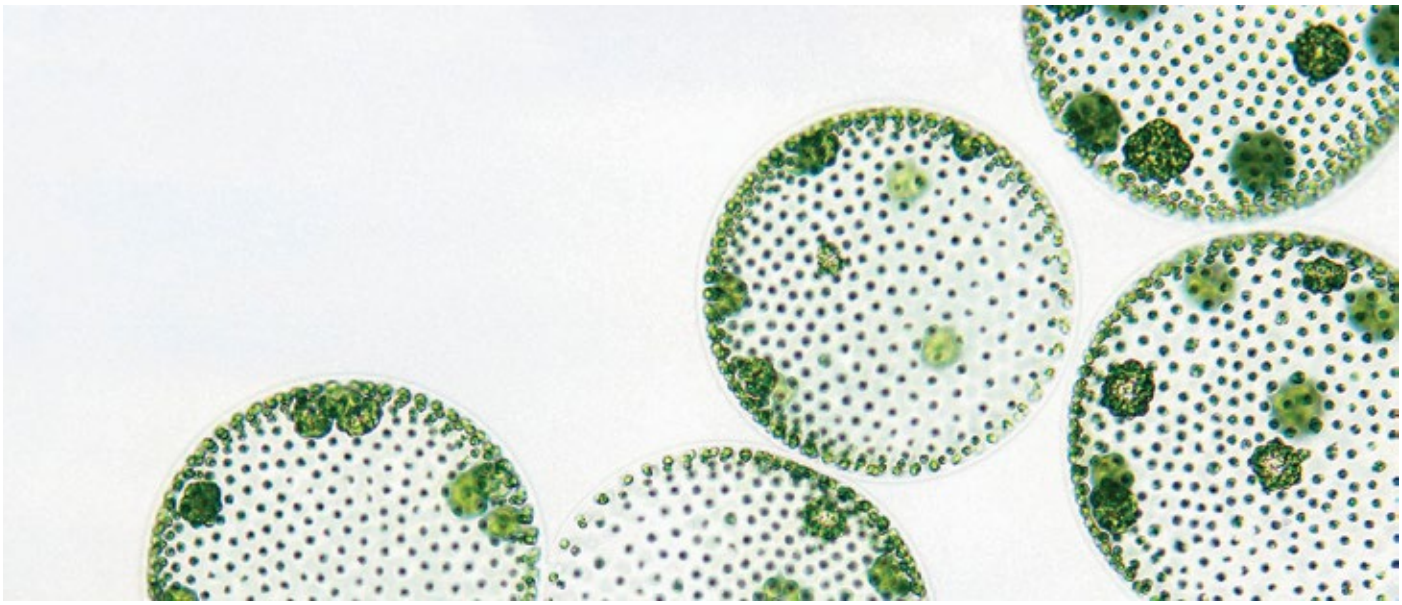
In 2015, the OECD published a new, updated issue of the Frascati Manual, for measuring research and development. The Ministry of Science has translated a chapter that deals with standard definitions of research and development, differentiating this activity from related activities, with a lot of illustrative examples that can help everyone to properly understand what research and experimental development activities are. http://www.mna.gov.me/rubrike/Statistika_istrazivanja_i_razvoja/

>> NATIONAL RESEARCH ON THE H2020 AND COST THEMES

cost
EUROPEAN COOPERATION
IN SCIENCE AND TECHNOLOGY

In late 2017, a competition was implemented for scientific research projects dealing with themes from the H2020 or COST EU programmes, enabling in this manner the adoption of priority research areas established at the European level, launching relevant research at the national level and faster linking with partners in Europe, as well as involving young researchers in prospective research areas. A total of 17 projects worth around EUR 270,000 have been supported. Four research teams joined H2020 projects as third parties, while three teams received support for application in 2018. The remaining 10 supported projects will implement national research on the themes compatible to those of the COST projects. Several projects under this competition refer to the training of young researchers for the adoption of modern scientific methods and techniques in partner institutions, the harmonization of scientific practices, and other ways of raising the level of national research.

>> PILOT PROGRAMME IMPLEMENTED FOR SUPPORT TO INNOVATIVE ACTIVITY

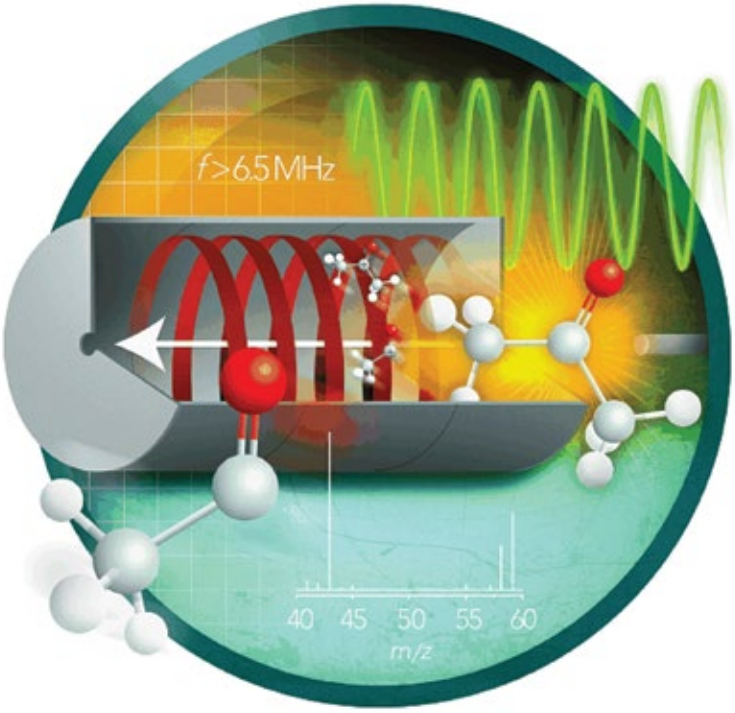


The system of innovative activities in Montenegro has started to be established only recently (2016), and one of the new support programmes is co-financing innovative projects. The goal of the Ministry of Science in the first cycle was to utilize small financial support to identify innovative organizations in Montenegro, their potentials and planned activities. The first call was announced at the beginning of November 2017, and all the innovative organizations in Montenegro had the right to apply, including academic institutions, scientific research institutions and business entities. New innovative solutions or the improvement of existing ones could have been nominated through this type of projects within the following strategic priorities: Energy; Agriculture and food; Sustainable development and tourism; Information and communication technologies; Medicine and human health; and New materials, products and services.

Based on the ranking list of the Evaluation Commission, the Ministry has approved the co-financing of five innovative projects in the amount of EUR 61,000, while the other submitted projects have failed to meet the minimum prescribed standards. Given that this was a pilot call, the experience gained from it will be used to further improve the financing instrument in order to adapt it to the current level of development of innovative activity.

>> PROJECT: **BLIZAR**

Q-Tek is a company that deals with the development and production of precision chemical analysis measuring instruments, i.e. mass spectrometers. Part of our team consists of experts from the subject areas with great experience of applying the instruments in practice, developing the methods of their application. The application of instruments is not in the domain of our activities, and they are most often used in forensic centres, laboratories, for example, for food control or for doping detection, as well as in clinical laboratories for several types of analysis, including the detection of drugs and contaminants. Mass spectrometers are also widely used in industry to control product quality, from food to oil industry. The world's biggest market is now China, due to the all-round growth of its economy. The goal of the "BLIZAR" project is the development of a new instrument that will be intended for the analysis of antioxidant activity in food products. The positive role of antioxidants for our organism is well known, and there are methods for diagnosing the deficiency of antioxidants in a particular person, but there is still no relevant method or instrument for rapid determination of the amount of antioxidants in fruit, vegetable or drink. In other words, a person with an antioxidant deficiency can only speculate whether eating particular food would improve the situation. Using expert knowledge, Q-Tek company wants to develop and offer to the market an instrument for solving this task. Successful implementation of the BLIZAR project will have a positive effect reflected in expanding the range of Q-Tek products and increasing the export capacity of Montenegro.



Opinion on the Call

Opening of this call is a very good thing, useful for society. This is a very good tool for implementing the Government's economic policy, because this way the Government can support companies and activities in the field of human health, quality of life, environmental protection (for example, rehabilitation of the red mud pond around the former Aluminium Plant Podgorica), IT and other technological and other knowledge-based activities that have no unwanted consequences for the infrastructure and natural resources of Montenegro.

Dr. Dmitry Tarasov, Q-Tek LLC

>> NEW CYCLE OF FINANCING CO-OPERATION WITH SLOVENIA

Pursuant to the Agreement between Montenegro and the Republic of Slovenia on Scientific and Technological Co-operation of 2 July 2008, on 15 December 2017, the Ministry of Science announced a call for the co-financing of scientific and technological co-operation between Montenegro and Slovenia for the period of 2018–2020, with the deadline for submitting the project proposals by 15 February 2018.

This is the fifth time in a row to open the possibility for Montenegrin scientists and scientific research teams to work with their colleagues from Slovenia on joint projects, develop mobility, exchange acquired knowledge and experience, and as a result of joint work on the project, apply and participate in European programmes for science and research.

>> AWARDS FOR SOCIALLY ENGAGING RESEARCH AND READY-TO-USE INNOVATIONS

ANNUAL AWARDS PRESENTED TO THE BEST RESEARCHERS

The Ministry of Science has presented the traditional Annual Scientific Achievement Awards for 2017 to the most successful scientists, who were distinguished by outstanding efforts and scientific results during the course of the year. The award has been presented in two categories: the most successful scientist; and inventor – innovator for the most successful innovative solution.

As for the category of "the most successful young talent in the field of science up to 20 years of age", unfortunately, no awards have been presented for 2017. In this category, applications have been received of young people who are talented in terms of their academic or study achievements, but without any noteworthy innovations or results in scientific research, which was required by the conditions of the competition.

"This situation has inspired us to consider the possibility of improving the award system itself in the future.

When presenting the 2017 awards, the system has already been improved by raising the criteria of impartiality to a greater level through the engagement of experts from abroad and greater valuation of scientific achievements through practical application. However, further options will be considered for rewarding excellence in science through: simplification and concretization of applications for awards; more precise definition of criteria; the amount, content and purpose of the prize pool, etc. The scientific award and its winners deserve the highest social attention and respect." - said PhD Nina Radulović, member of the evaluation committee.

GRATITUDE TO FAMILY, TEACHERS AND MENTORS

Excerpt from the address by PhD Igor Pajović at the Award Ceremony

"First of all, I have to say that it is a great honour for me to be nominated and worthy to be awarded by the Ministry of Science as the most successful scientist in Montenegro for 2017. It goes without saying that this achievement has required a lot of work, self-deprivation, dedication, will, ideas and finally knowledge to design a research, present it to funders, implement it, and to publish its results. Satisfaction is not just mine; I share it, in the first place, with members of my family, who unconditionally supported me in an effort to engage in science. I won't say anything new if I say that science requires more than eight hours of working time a day; it requires full commitment, and for such an investment the will of an individual is insufficient – the support of the closest ones is also required. I had, and I still have that support, which I am very grateful for.

I find it appropriate to mention also my teachers, professors and mentors who have invested their knowledge to open the door to me, to show me the beauty and introduce me to the secrets of research and scientific activity. I don't want this speech to be too personal or sentimental, but I do want to single out Prof. Dušan Petrić, a professor in the full sense of the word, who has long ceased to be my teacher and instructor and who has become my true friend...

...In the end, it is important to mention that the Ministry of Science has also contributed to this success of mine. In the last few cycles, the Ministry has especially supported ideas and projects that lead to the linking of scientific teams from Montenegro within the state itself and with foreign partners; projects that involve the economy and especially the projects that are socially responsible to put it that way. In other words, projects whose results are widely applicable and whose benefits are enjoyed by citizens, institutions and society as a whole."

THE MOTIVATION IS TO CREATE SOMETHING USEFUL FOR SOCIETY

Excerpt from the address by PhD Martin Ćalasan *at the Award Ceremony*

"I see the award of the Ministry of Science for inventor – innovator for the most successful innovative solution as great support, great motive, great recognition, but also a great obligation.

...In short, what was my direction of research in the field of innovation? When I started drafting my doctoral dissertation, my mentor Prof. Vladan Vujičić and I decided that we must implement something new in science with a mandatory experiment. We dealt with the oldest electric machine – a switched reluctance motor. Although it was the first machine discovered, due to Tesla's discoveries and the invention of an asynchronous machine, it was suppressed from use. Why did this happen? Because there was a need for the existence of a number of sensors, complex electronics and control to manage the switched reluctance motor. It should be noted that these sensors, such as the position sensor, often cost a few times the motor itself, and they are also sensitive to humidity, temperature, vibrations, and so on. Moreover, its operation was not stable. With the support and assistance of my mentor, I have implemented two new topologies of the converter to operate this motor that do not require the position sensor, or measurement, regulation and the like, while enabling stable operation, high efficiency of the motor, and its operation at a wide range of speeds. We realized all these prototype converters in our laboratory and we published the results of simulation and experimental research in journals indexed in the SCI list. I would like to point out that right now, through simulations, we are testing the possibility of applying proposed topologies to DC micro grid applications that represent the future of energy. Also, we are working on the realization of several more equally simple converters that we test both through simulations and experimentally.

Finally, once again, let me emphasize that I am really honoured to receive the award of the Ministry of Science, let me express my strong respect and support for the awarding policy of the Ministry of Science, especially in the field of innovation, and let me emphasize that I really respect and support the policy, guidelines and numerous science development programmes promoted by the Ministry of Science, which provide great opportunities for all researchers."

>> COUNTERPARTS FROM THE ADRIATIC RENEW SCIENTIFIC CO-OPERATION

The Agreement on Scientific and Technological Co-operation between the Government of Montenegro and the Government of the Republic of Italy was signed in 2013 in Podgorica. On 15 June 2016, the second call for co-financing of joint scientific research projects was announced for the period of 2017-2018. After joint evaluation, five projects were approved for co-financing.

>> IMPLEMENTATION OF NEW PROJECTS OF MONTENEGRIN AND CROATIAN SCIENTISTS STARTS

The Ministry of Science achieves extremely successful bilateral co-operation with the Ministry of Science and Education of the Republic of Croatia. The Government of Montenegro concluded the Agreement on Scientific and Technological Co-operation with the Government of the Republic of Croatia in 2009. During 2017, the Joint Commission of the two countries approved the financing of 9 joint scientific research projects for the period of 2017-2018.

>> PUBLIC CALL FOR TEHNOPOLIS LABORATORIES

Based on the Public Call for Drafting the Preliminary Feasibility Study for the Industrial Design Laboratory in Tehnopolis, a team of the Faculty of Mechanical Engineering of the University of Montenegro was engaged in late 2017 to prepare the study as the first step in putting this laboratory into operation. As for the further steps, resources from the EU Pre-Accession Funds (IPA) have been programmed.

>> PROJECT: **COMPARING THE STATE OF SMALL-SCALE COASTAL FISHING RESOURCES ON THE EASTERN COAST OF THE ADRIATIC**

- Bilateral project Montenegro – Croatia
- Leader: Dr. Aleksandar Joksimović
- Partners: Institute of Marine Biology of the University of Montenegro and the Institute of Oceanography and Fisheries from Split
- duration: 2 years – 2018-2020

Small-scale coastal fishing belongs to commercial fishing, which is mainly done by smaller boats in the coastal part of the Adriatic Sea. The characteristic of this type of fishing is that it uses a whole range of tools (fishing nets, longlines, various traps, spears), many of which fall into the category of traditional fishing tools, especially on the eastern coast of the Adriatic. In Montenegro, the resources of small coastal fishing (seine nets, drift nets, longlines, traps and other traditional tools) are little known, although there is a long tradition of engaging in this type of fishing. For these reasons, the existing data for the eastern coast of the Adriatic (Croatia and Montenegro) were compared, based on which the impact of this activity on the status of ichthyofauna was assessed in general. Using the rich experience of Croatia, a proper monitoring system for this method of fishing has been established in our country.

We are also witnesses of the entry, or appearance of new (invasive) fish species in the Adriatic Sea. These new, mostly aggressive species have a huge impact on domicile fish species, changing established ecological niches on our coast. The ultimate goal of this research is that the data find the way to the end users – primarily our fishermen. Of course, the data are also the basis for the adoption of strategic documents in responsible fisheries development on the eastern coast of the Adriatic.

In addition to the established scientific practices, the result of this project will be the publication of several scientific papers for conferences or scientific journals and a practical brochure for engaging citizens in the monitoring of marine organisms.

>> COMPETITION FOR TRAINING OF PHYSICS TEACHERS IN CERN IN 2018

The international three-week programme for high school physics teachers is organized in July by CERN. The programme is intended for high school teachers who want to improve their knowledge in the field of particle physics and related technologies, as well as to get trained in effective methods of teaching physics. Since 2015, the Ministry of Science has supported the participation of two physics teachers at the summer school, and in 2018 it will finance the participation of the third teacher, Vladimir Popović from the Slobodan Škerović Gymnasium.

>> SIGNIFICANT RESULTS FOR SOCIETY, ECONOMY AND ENVIRONMENT THROUGH COLLABORATIVE GRANTS UNDER HERIC PROGRAMME

In the period of 2012-2018, the Ministry of Science, together with the Ministry of Education, implements a programme for the improvement of the research and higher education system called "Higher Education and Research for Innovation and Competitiveness", through which 8 large collaborative research projects and pilot Centre of Excellence have been funded. Within the programme, EUR 7.5 million has been allocated for the research component. The projects funded so far are presented below.

"NEW ICT COMPRESSIVE SENSING TRENDS APPLIED TO MULTIMEDIA, BIOMEDICINE AND COMMUNICATIONS"

- Acronym: CS-ICT
- Project proponent: University of Montenegro, Faculty of Electrical Engineering
- Project duration: 01/06/2014 – 30/09/2017
- Project value: EUR 372,000
- Project leader: Prof. Srđan Stanković
- Contact: Anđela Draganić, andjelad@ac.me
- Web: http://www.cs-ict.ac.me/

One of the main goals of the CS-ICT project was the development of research capacities in the field of compressive sensing, with the aim of achieving competitiveness and attractiveness in this area. The Laboratory for Compressive Sensing and Emerging Technologies has been established within the CS-ICT project at the Faculty of Electrical Engineering. This Laboratory, whose members are distinguished by numerous scientific publications, has been intensively transformed into a research centre. The research group is focused on fundamental and applied research, and its results, methods and technologies are competitive with world research institutions. The newly formed Laboratory has already been recognized worldwide as an eminent research and development centre for compressive sensing, and accordingly, we have offers for co-operation in the upcoming period. During the implementation of the project, co-operation was established with the University of Minnesota, the Moscow State University, Imperial College, the University of Ghent, the University of Pittsburgh, Carnegie Mellon University, the University of Heidelberg, and the Slovenian company EFOS (practical application of developed solutions in the *Trapview* automated pest monitoring system).

On the basis of the achieved results and co-operation on the CS-ICT project, new possibilities for funding the research have been opened. Namely, a grant was received from the National Science Foundation of China (January 2016-December 2019) on the topic of "Compressive Sensing and Time-Frequency Analysis with Applications". The beneficiaries of the grant are the University of Montenegro, Nanyang University in Singapore and Zheijang University of China. Project leader is Prof. Srđan Stanković.

The development of new methods for data analysis and processing using compressive sensing, graphs, and time-frequency analysis is the theme of the project application titled "Graph signal processing on big data exhibiting sparsity property". The project relies on research initiated by the CS-ICT project, and the intention is to nominate the application for funding under H2020 programme and the ERC Advanced Grant 2018 call.

"CONSTRUCTION OF MONITORING STATION FOR LIGHTNING RESEARCH ON THE MOUNTAIN LOVĆEN"

- Acronym: LAMS
- Project proponent: Mediteran University, Faculty of Information Technology
- Project duration: 01/04/2015 – 30/12/2017
- Project value: EUR 325,000
- Project leader: Prof. Adis Balota
- Contact: lams@unimediteran.net
- Web: http://www.heric.me/kategorije-clanaka/grant-lams

The LAMS project offers one of the solutions to the problem of selecting methods and tools for registering atmospheric pressure discharges with the help of dedicated equipment that is installed and serves to measure the lightning current strokes. The lightning stroke parameters are collected and processed by the developed software solution within the LAMS project, which combines the installed equipment for measuring lightning current strokes.

The entire information system works in real time and collects data at the place of origin. The monitoring station provides quality results, and the developed information system has registered over 1400 atmospheric pressure discharges so far.

The data obtained from the LAMS system are used for further data processing with the help of a number of dedicated applications. Based on the adopted methodology, for each record of lightning current strokes, the calculation is made of the steepness of the curve and its lowest point. Further work on the improvement of methodology and measuring sensors is a constant duty of the researchers.

The monitoring station system is located at a tower of the Radio Broadcasting Centre (RDC) of Montenegro, on Lovćen Mountain (1749 meters above sea level), with one of its parts in the power transformer station (TS) Škaljari, Kotor. In agreement with RDC, one of the project partners, further operation of the measuring equipment has been ensured even after the completion of the project. Also, in co-operation with the Faculty of Electrical Engineering and Computing (FER) from Zagreb, we have continued data exchange between LLS and LAMS systems. The above data exchange and their correlation are extremely important for determining the quality of registered lightning current strokes. In the following period, RDC will work on the calculations of overvoltage protection of TS Škaljari – RDC Lovćen. The data obtained from the LAMS system will also be used for this study.

Electric Power Company of Montenegro (EPCG), which was also a partner in the project, showed interest in maintaining the monitoring station and having the obtained data used for designing and overvoltage protection in power systems. In order for the LAMS project to be connected with renowned international systems for locating atmospheric pressure discharges, negotiations have been initiated with the University of Graz on the exchange of data between LINET and LAMS. In the coming period, publication is expected of a number of scientific and professional papers on the measurement of the curve of lightning current strokes, as well as the presentation of the final results of the LAMS project, which will additionally raise the interest of both the professional public and industry representatives.

"LABORATORY FOR PRODUCT DESIGN, INCLUDING DISCIPLINES, SUCH AS GRAPHIC, INTERIOR AND FASHION DESIGN"

- Acronym: PRODE
- Project proponent: University of Donja Gorica, Faculty of Polytechnics
- Project duration: 01/06/2014 – 30/11/2017
- Project value: EUR 337,000
- Project leader: Prof. Sanja Ivanović
- Contact: sanja.ivanovic@udg.edu.me;
- Web: http://www.heric.me/kategorije-clanaka/grant-prode

Product design implies the process of creating a new product or service that the company will sell to its customers. The Laboratory for Product Design is located at the University of Donja Gorica and represents an academic and professional centre for the development of new products and services. The Laboratory is managed by the Faculty of Polytechnics in co-operation with national and international partners. The basic idea behind this project is to improve the performance of the Montenegrin economy through the creation of a technology transfer environment. The Laboratory serves for the creation and development of prototypes of various products, such as cardboard, plastic, textile, wood, stone and marble products. Within this Laboratory, there are 3D Printer, 3D Scanner, Shimadzu - EZ Tester - Table top testing machine, Wide Printer and Wide Station.

"VALORIZING THE MONTENEGRIN KATUNS THROUGH SUSTAINABLE DEVELOPMENT OF AGRICULTURE AND TOURISM"

- Acronym: KATUN
- Project proponent: University of Montenegro, Biotechnical Faculty
- Project duration: 01/04/2015 – 30/09/2017
- Project value: EUR 315,000
- Project leader: Prof. Milan Marković
- Contact: mmarkoni@t-com.me;
- Web: http://www.katun.me

Katuns are a unique socio-cultural resource of Montenegro that should be preserved and revitalized by implementing new activities in order for them to become distinctive and attractive tourist destinations. The research was focused on two recognizable katun types: *Kučke planine* and the wider area of *Durmitor*, both characterized by high diversity in landscapes, biodiversity, resources available for agricultural production, different type of dairy products and rich cultural-historical heritage, architecture etc. The aim of the project was to create a knowledge base for the sustainability of mountain agriculture and increase its competitiveness, to preserve an important part of the cultural-historical heritage of rural areas and to launch agro-tourism in katuns as specific locations or nuclei of further social and economic development on the Montenegrin mountains.

"Although we have done our best to get as close as possible to the exact total number of katuns whose remains can still be seen on *Kučka planina* and to determine their position, size, types and purpose, it is very likely that some remains of buildings used for livestock in some of the remote mountain areas have remained out of sight and records. Therefore, we do not consider this research to be complete or final, but we hope that it will encourage interest in katuns, enabling us to complete and enrich the results obtained. Seeing for ourselves the impact of time that turns abandoned katuns into piles of rocks blending with the landscape, we want to draw attention to the urgency, need and importance of determining the actual state of our mountain architectural and construction heritage, since this task becomes more difficult to implement every day, with the extent of the realistically expected results on the decrease. ...We use the opportunity to express our gratitude and respect to the true heroes of this story – the people from katuns who still bring their livestock to the mountains. Without their persistence to maintain the rhythm of traditional life, the data presented here would be only part of a study of one already concluded part of the past. We hope that our work will draw a portion of the general attention to the problems these people are facing, the importance of the activities they perform and the possibilities offered by the katun context of life."

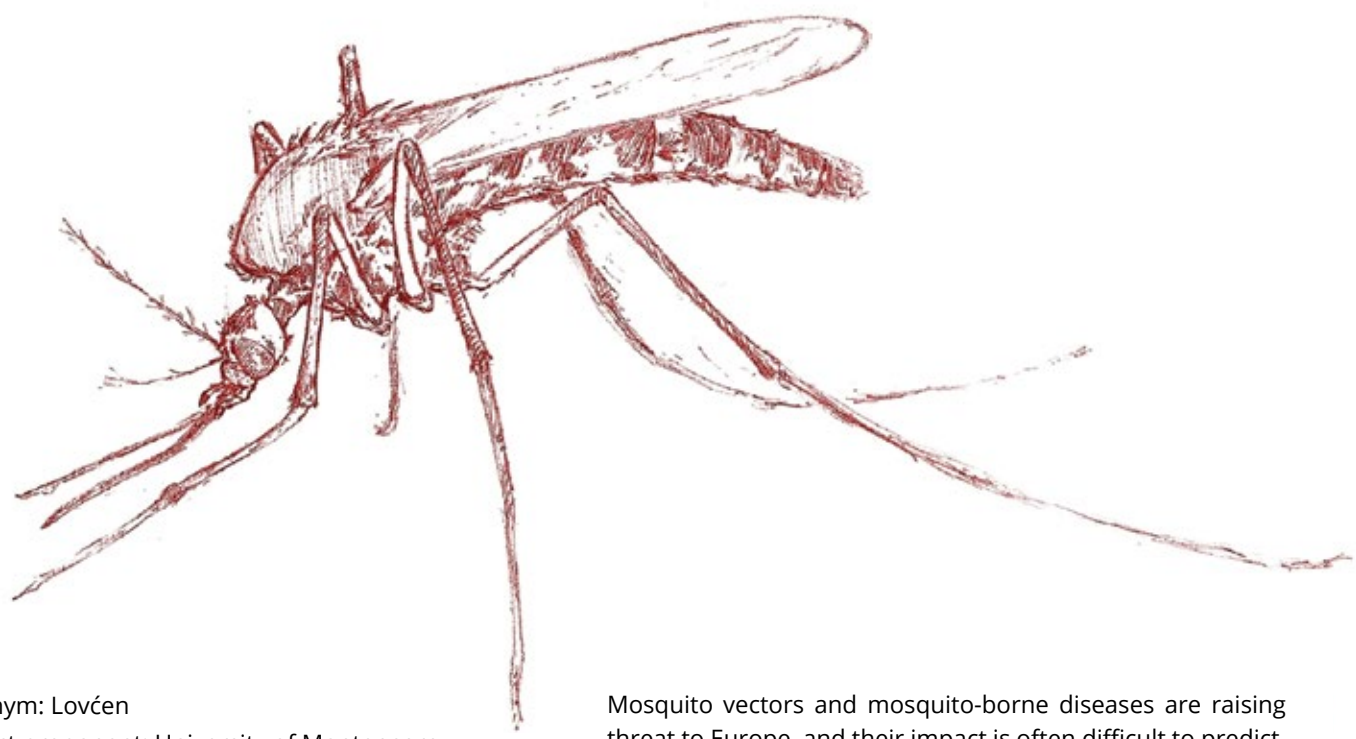
An excerpt from the monograph:
Katuni Kučke planine, University of Montenegro, 2017.

"IMPLEMENTATION AND PROMOTION OF SUSTAINABLE DEVELOPMENT IN A.D. MARINA BAR"

- Acronym: Sust-Marina
- Project proponent: University of Montenegro, Maritime Faculty Kotor
- Project duration: 01/06/2014 – 28/02/2018
- Project value: EUR 240,000
- Project leader: Prof. Branislav Dragović
- Contact: branod@ac.me
- Web: http://www.heric.me/kategorije-clanaka/grant-sust-marina

The improvement of coastal areas and nautical tourism has been gaining in importance in Montenegro, and the state administration is becoming increasingly aware of the need to protect and improve these areas in order to preserve their natural beauty and ensure long-term vitality as tourist destinations. Tourists are increasingly seeking sustainable coastal areas and ports in which they will be able to relax, recreate, discover their original natural, cultural and social properties. In response to this need, the SUST-MARINA project proposed the development of approaches and strategies that enable better planning and management of the sustainable development of the second largest port in Montenegro, AD Marina Bar. Some of the practical results of the project are the certification of AD Marina Bar, which became the first Blue Flag Marina in Montenegro, the first business system from the maritime industry certified by TUV Rheinland for ISO 9001:2015 and ISO 14001:2015 (QMS and EMS), and Gold Anchor Marina certified by TYHA.

"SURVEILLANCE OF INVASIVE AND NATIVE MOSQUITO VECTORS AND PATHOGENS THEY TRANSMIT IN MONTENEGRO"



- Acronym: Lovćen
- Project proponent: University of Montenegro, Biotechnical Faculty
- Project duration: 01/06/2014 – 30/11/2017
- Project value: EUR 390,000
- Project leader: PhD Igor Pajović
- Contact: pajovicb.igor@gmail.com
- Web: http://project-lovcen.me

Mosquito vectors and mosquito-borne diseases are raising threat to Europe, and their impact is often difficult to predict. Their supervision and control require effective and standardized methods, integrated knowledge and awareness of scientists, academics and policy makers. The main goal of the project was to exchange knowledge and methodology, improve higher education, enable training of new experts, improve national policies, create innovations and disseminate scientific information on mosquito vectors and mosquito-borne diseases.

"DEVELOPMENT, VALIDATION AND APPLICATION OF TELEMEDICINE SYSTEMS TELEMONTEKG (TM EKG) FOR THE RAPID DIAGNOSIS OF HEART DISEASES IN MONTENEGRO"

- Acronym: Telemont EKG
- Project proponent: Clinical Centre of Montenegro
- Project duration: 01/06/2015 – 31/05/2017
- Project value: EUR 315,000
- Project leader: Prof. Vesna Miranović
- Contact: vesna.miranovic@kccg.me
- Web: http://www.heric.me/kategorije-clanaka/grant-telemont-ekg

The essence of the project task is to create a system for the rapid diagnosis of heart rhythm disorders, which should be accurate, accessible, market-competitive, easy to use and for which there is great demand in the market. The system has been developed until the first prototype, to enforce its validation and eliminate defects, and has been patented.

During the project, data from 400 patients have been collected, for whom 700 electrocardiogram records have been made, which has been used for validation – the system has been made more reliable and therefore useful in the population of people requiring rapid diagnosis of heart rhythm disorders. This is important because Montenegro is in a group of countries with a high mortality rate from cardiovascular diseases. Also, the Montenegrin healthcare system suffers from a chronic lack of funds, and TELEMONTEKG is an excellent response to the institutional demand of the healthcare system for better, smarter, faster and more precise medical technology solutions that will facilitate the availability of diagnostics on a personal level and reduce the costs of the healthcare system at the national level.

BIO-ICT CENTRE OF EXCELLENCE
PIONEERING STEPS IN SCIENTIFICALLY BASED INNOVATIONS

- Acronym: BIO-ICT
- Project proponent: Faculty of Electrical Engineering of the University of Montenegro
- Project duration: 01/06/2014 – 31/05/2018
- Project value: EUR 3.7 million
- Project leader: Prof. Igor Radusinović
- Contact: igorr@ac.me
- Web: www.bio-ict.ac.me

The BIO-ICT Centre of Excellence project is implemented as a four-year research programme at the University of Montenegro, led by the Faculty of Electrical Engineering with a number of domestic and international partners. The main research directions in the project are modular and open IoT platforms for the development of services and applications in the field of agriculture, marine biology and environmental monitoring. This modern IoT platform enables the expansion of scientific research and innovation work in other areas of importance for the digital transformation of Montenegrin society such as education, healthcare, traffic, energy and transport.

In its previous work, the BIO-ICT Centre of Excellence has achieved many successful results in the field of development of new scientific principles and methods for the improvement of products and services, using its activities to affirm interdisciplinary research in Montenegro, connect the academic community with the business sector, strengthen the Montenegrin scientific links with international partners, and improve the innovative potential of young people. A large number of scientific papers have been published in domestic and international renowned journals and conferences. One of the greatest scientific achievements is the fact that five national patents have been granted to the BIO-ICT Centre, one of which has been submitted to the European Patent Office: The Smart System for Indoors Plant Growing with Built Expert Logic, Resistive Mirror Based Controllable Constant Power Generator, Electronic System to Control Irrigation, Method and Device for Synchronized Phasor and Frequency Measurements in Power Systems, System and Method for Collecting Video and Scalar Data from Software-Defined Wireless Sensor Network.

At the moment, we are working on several new, technologically advanced products and services, and at this stage of work of the Centre we have additionally focused on commercialization, in terms of adapting products and services to the needs of the market, primarily the economic partners of the BIO-ICT Centre, but also with the possibility of much broader applications in the international market. Commercial products and services, innovations and activities that have been successfully developed and are continuing to grow within the BIO-ICT Centre are the following: SEMaR System, smart buoy with solar power supply for monitoring the parameters of the marine environment in real time; LiveGate, the Internet of Things web platform that enables data collection and analysis of different types of hardware circuits; Smart irrigation system that determines the optimal irrigation period that is directly responsive to climate conditions, soil and plant parameters as to obtain rational water consumption in accordance with plant needs; SharpEye, multimedia sensor platform that seeks to eliminate the need for manual sampling by providing detailed scalar and multimedia information about the environment in which it is located, in order to optimize crop management; DroneMapper, a cloud application that serves to automate geo-referencing and create maps with drone images, designed to support multiple users and allow multiple faster map processing; Development of the pedological information system of Montenegro, i.e. developed raster maps that are merged through a web application, and obtained by clustering and visualization of pedologic data using data mining techniques and spatial interpolation; Continuous biomonitoring of seawater quality using a remote fibre-optic bio-sensor for the registration and analysis of cardiac activity of aquatic invertebrates (mussels); Monitoring of biotoxin in mussels' meat; Negative effect of mussels' consumption on Human Health and Green Vegetable Analysis, grown in a controlled environment, with an emphasis on determining the content of antioxidant compounds due to its beneficial effect on human health and BioPortal.me.

In co-operation with the Faculty of Electrical Engineering, BIO-ICT is organizing a traditional IT international conference in Žabljak, which has been dedicated to BIO-ICT topics for the third consecutive year, and since 2017 it has been supported by the IEEE. In co-operation with the Fore-Mont project, BIO-ICT organized the first start-up competition at the Faculty of Electrical Engineering, where students from all Montenegrin universities participated and presented their innovative IT ideas. We are constantly expanding the number of commercial partners, and we have signed co-operation agreements with CETI, Amplitudo, Institute for Metrology, JU Morsko dobro.

The sustainability of BIO-ICT is planned through the application to several international for which the results are yet expected. Recently, UNIDO support was confirmed in the amount of EUR 358,000. This will continue the activities carried out in the past four years at the University of Montenegro with a focus on strengthening the commercialization of research, national capacities in the field of transfer of knowledge and technologies and the commercialization of innovative solutions. In line with the development priorities of Montenegro in the field of science and the results achieved so far in the work of the first Centre of Excellence in Montenegro, the project activities will continue to be focused on the development of the agriculture, ecology, health and information and communication technology sectors.

>> IAEA – ATOMS FOR PEACE

International Atomic Energy Agency – IAEA was founded in 1957 as the world's "Atoms for Peace" organization with the task of promoting the application of atomic energy for peaceful purposes. In order to contribute to the progress of developing countries, the Agency particularly stimulates the implementation of research projects aimed at finding ways for more economic use of resources, especially in developing countries, in areas identified as priorities: nuclear science, food and agriculture, human health, environment, water resources and nuclear safety.

Montenegro renewed its full membership in the IAEA in October 2006, and successful co-operation is being achieved in all fields, including technical assistance programmes. In the period of 2007–2017, Montenegro had 13 national projects within this co-operation, with a total budget of over EUR 3 million. As for the 2018-2019 cycle, two projects with a total budget of EUR 0.6 million were approved, which are intended for improvement of the CT diagnostics for children in Montenegro, and equipping the national reference laboratory for food and feed control.
www.iaea.org

EUREKA
innovation across borders

EUREKA PROGRAMME OPPORTUNITIES FOR DEVELOPMENT OF MARKET-DRIVEN INNOVATIONS

EUREKA is a European initiative for financing market-driven projects. The programme helps build partnerships through joint international projects in order to strengthen European competitiveness. Expected results of the projects are new products, services or processes.
Montenegro became a full member of EUREKA Programme on 22 June 2012. In this way, an opportunity has opened to the business and academic sectors to actively engage in industrial research and gain experience in the preparation and implementation of these projects. In the period of 2012–2016, three projects were implemented with participation of partners – companies from Montenegro, while two projects with participation of the universities are currently underway. The Ministry funds the costs of participation of domestic partners in international consortia in the amount of EUR 15,000 from its own budget. www.eurekanetwork.org

>> NATO SPS PROGRAMME

NATO's Science for Peace and Security Programme was established in 1958 and aims to promote international security and stability by applying the best scientific-technological expertise, strengthening human resources (support for young scientists), and promoting regional co-operation between NATO member states and partner countries. Activities funded through this programme must be in line with the key priorities of the programme, that is, they should be directed at the security and strategic goals of NATO. The programme supports co-operation through three mechanisms: multi-annual applied projects, trainings and workshops. Three projects with partners from Montenegro are underway, and six have been successfully completed. www.nato.int

>> CHAPTER OF SCIENCE AND RESEARCH: **EUROPE AND US**

Vision of Milena Milunović, representative of the Ministry of Science in the Mission of Montenegro to Brussels, on the development of activities in the context of global tendencies

Chapter 25 – Science and Research was the first to be opened and temporarily closed in the process of Montenegro's accession to the European Union, in December 2012. Several recent EC's Montenegro Progress Reports in this area have noted some progress, while the Commission highlights a good level of preparation as the overall assessment of the current situation. As in previous years, key EC recommendations for Chapter 25 relate to: increasing participation in the Horizon 2020 Framework Programme and increasing investment in science and research, with a particular focus on stimulating private sector investment.

However, some progress is no longer an acceptable term, for Europe, or for Montenegro. In the year ahead of us, Europe is expecting more from us, but what is most important in this process is that Montenegro wants to offer more. Excellence is a term that is increasingly used and demanded by Europe from its members, realizing that this is the only way it can stand alongside global leaders. Robert-Jan Smits, EC Director-General of DG Research and Innovation, has recently stated that Europe had already lost two games in the field of digital innovation with America and China, and that the ship would sail for good without us, unless we caught the third wave. The first wave was when the basic Internet infrastructure was established, while the second one brought new digital applications and we must humbly acknowledge that Europe had not played a leading role here. Apple, Microsoft, Google, Yahoo, Facebook, Amazon, Uber, Twitter, AirBnB – all the big names of the digital world are American. Even in the cases where Europeans do take the lead, they are not able to dominate the market like their counterparts from America (a good example is Spotify from Sweden). Or, they are usually quickly taken over by an American competitor, as illustrated by the Skype example (originally created in Estonia, but taken over by Microsoft).

So, what is this third wave and why is it so important? During the third wave, which is already developing, the Internet and

digital technologies play an important role in traditional sectors such as transport, energy, healthcare and engineering, as well as education. None of these sectors can now be imagined without the presence of digitalization. And how does Europe intend to catch that wave? It is clear that research and innovation play a key role. Nesta (Global Innovation Foundation) and the Lisbon Council have calculated that around 2/3 of the European economic growth between 1995 and 2007 was the result of research and innovation. Studies show that companies investing in research and development have a return on investment of 10 to 30%. Therefore, in the current Research and Innovation Framework Programme H2020, Europe has committed an amount of EUR 75 billion, with plans to significantly increase this allocation in the next framework programme, FP9. Europe has entered a global innovative race and has directed all its efforts to catching up with and potentially front-running the third digital innovative wave. There are almost no EU documents that do not stress the importance of innovation, investment in start-ups, small and medium-sized enterprises and innovative companies. The need for investment is more than clear when we see what is happening in Asia. South Korea is heading towards the allocation of 5% of GDP for this purpose, while China has an increase in research and development spending of 22% per year.

Many will say that Montenegro is too far from the EU average, with 0.38% of GDP allocation for R&D in 2015, but if we know that it used to be 0.13 some years ago, then it is clear that significant progress has been made in previous years. What is encouraging and what the EC particularly welcomed is this year's increase in the science budget by over 60%. This has responded to the request for increased investment in science more effectively than ever. In the previous year, for the first time since becoming a member of H2020, we managed to achieve the level of return of funds which exceeded our annual contribution to the programme. The new Strategy of Scientific Research Activities for the period of 2017-2021 is far more intensive, both in the domain of national and international scientific policy. We must understand that we need to open for co-operation, at national, regional and European level. This is why we have become part of large systems like EMBL, EMBO, and CERN. Our scientists now have the opportunity to work hand in hand with the best in the fields of physics, engineering, biology, medicine. We have launched the largest regional initiative in the field of science so far – SEEIST, which has already been supported by international subjects and almost certainly EC. We are on the way to adopting a Smart Specialization Strategy, a document that should filter the areas in which we have the highest capacity and where we need to direct our forces. We cannot be good at everything, but we can become very good in one or two areas.

Let us take Estonian example. When this country regained its independence in 1991, after the collapse of the Soviet Union, less than half of its population had a telephone line, and the only connection with the outside world was a Finnish mobile phone hidden in the Ministry of Foreign Affairs. Two decades later, Estonia is the European leader in technology. How has the smallest Baltic state developed such a strong technical culture? Foundations were set up in 1992 when the Estonian Prime Minister at the time Mart Laar set up a young government, which conducted effective fiscal reform, privatisation and set up government e-services. New companies could be registered smoothly and without delay, which was an important incentive for entrepreneurs who were waiting. Poor infrastructure, the legacy of the crisis years of the Soviet era, meant that the new political class began from scratch. A national project of equipping classrooms with computers was conducted, so all schools were online as of 1998. In 2000, when the Estonian government proclaimed Internet access as a human right, the Internet became available even in the country's most remote areas. Free Wi-Fi became customary. Seals, papers and long queues have been replaced by "e-government". The government's moves were followed by the private sector: selling Skype to eBay in 2005 for USD 2.6 billion created a new generation of Estonian investors that earned tens of millions of euros from their shares – and used part of their fortune for good cause, such as funding start-ups. Today, Tehnopol, the business centre of Tallinn, has more than 150 technology companies. According to Taavet Hinrikus, one of the first Skype employees and a co-founder of TransferWise, a money transfer service among users, operating across Europe and America, it was the small domestic market that forced start-ups to think about the global market. According to the World Bank, more than 14,000 new companies were registered in Estonia in 2011, which is 40% more than in 2008. The high-tech industries now make up about 15% of GDP.

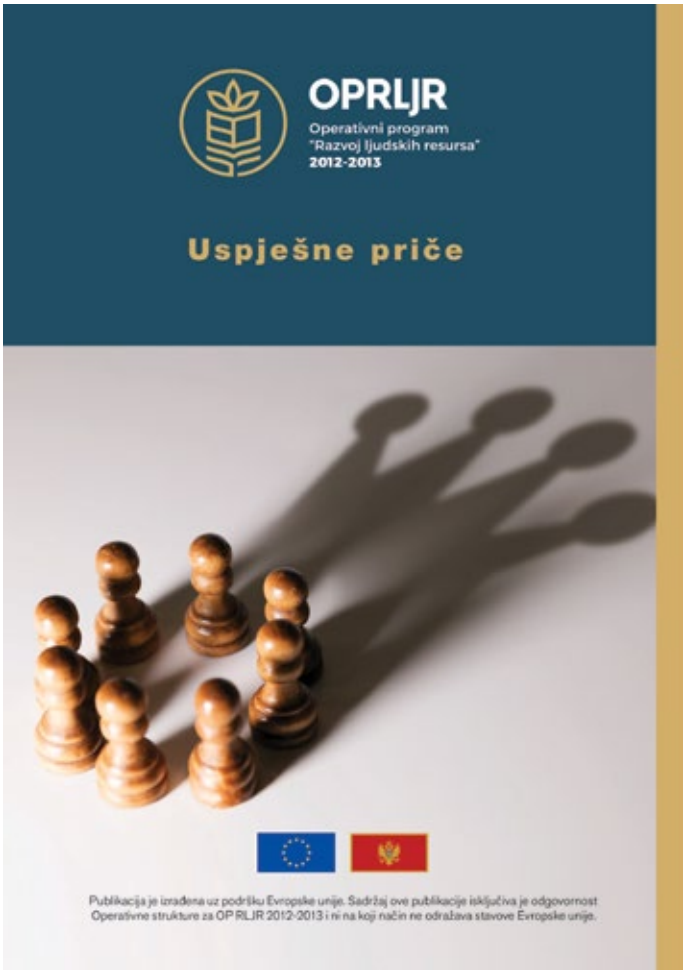
How can other countries – those that do not have the size of Estonia and a clean start position – follow its example? "It's a bit awkward to say it, but do what we did", says former Estonian President Thomas Hendrik Ilves. He argues that Estonia's success is not so much linked to the success of technology development as it is to escape from "inherited thinking". It is important to have a vision and remain committed to it, because, as British scientist Simon Singh put it, "vision is a destination, a fixed point to which we direct all our efforts. The strategy is the path that should lead us to that point".
Finally, let us get back to the start. We do not have to do all this for Europe, we should do all of this for ourselves – increasing investment in science, achieving better results in the H2020, opening new opportunities for Montenegro and the region through new scientific infrastructure in the Balkans, encouraging innovation, international collaboration – will bring benefits primarily to Montenegro, making it much easier for us to become part of a larger system, belong to someone else, and again remain our own.

>> COMPLETED PROJECTS
HUMAN RESOURCES IPA COMPONENT

Within the IPA IV Component "Human Resources Development" 2007-13, the Ministry of Science was in charge of the implementation of Measure 2.2 "Improving the Innovative Capacities of Higher Education, Research and Business", with two key activities undertaken within the Measure, a grant scheme for strengthening links between academic community and the economy, and the Framework Agreement for Support to National Participation in Horizon 2020.

The grant scheme has provided funding for applied and developmental research projects. The final benefits from the implementation of these projects relate to knowledge transfer and the creation of stronger links between the academic and the business sector, with the aim of strengthening both sectors and the competitiveness of the national economy.
The projects were completed within the planned deadline (until 31 December 2017), and the duration of the contract was from 12 to 15 months. Among the beneficiaries of grants, there were 5 enterprises, 5 faculties, 3 NGOs and 1 state institution.

Framework service agreement: Strengthening national capacity to participate in HORIZON 2020 has been concluded with the IBF consulting company and lasted for 10 months in 2017. During the project, mentoring for preparation of project applications for 10 institutions was provided, as well as a programme of intensive training on Horizon 2020, in six five-day cycles, with over 100 participants from scientific-research institutions, small and medium-sized enterprises, NGOs and the public sector.



>> PROGRAMMING FUTURE IPA FUNDS UNDER THE HUMAN RESOURCES AND COMPETITIVENESS COMPONENT

Continuing activities from the IPA I Financial Perspective, and taking into account the strategic commitments of the Ministry of Science for the period until 2021, the Ministry of Science plans to use pre-accession funds from two sectors of the current IPA Perspective (2014-2020). Within the sector of "Education, Employment and Social Policy", the employment of holders of doctoral degrees and scientists is envisaged in the academic sector and business, as one of the contributions to the achievement of the first goal of the SSRA 2017-2021. In order to continue the activities on strengthening the research infrastructure, support will be provided through the sector of "Competitiveness and Innovation" for improvement of activities of Innovation and Entrepreneurship Centre "Tehnopolis" from Nikšić, as well as of future activities within the STP Podgorica, the BIO ICT Centre of Excellence and other research infrastructures.

>> IPA PROJECT FOR IMPROVING STATISTICS COMPLETED

As the official producer of research and development statistics, the Ministry of Science was responsible for one component of the national IPA project "Improving statistical capacity for economic and social statistics". The project was implemented during 2016 and 2017, and the Montenegrin Scientific Network information system was presented at the final conference in the EU Info Centre. Thanks to this IPA project, this system has been upgraded into an administrative source of statistical data.

>> EXCEPTIONAL OPPORTUNITIES FOR NEW GENERATIONS OF PHYSICISTS IN MONTENEGRO – STUDENT SUMMER SCHOOL IN CERN IN 2017 AND 2018

Thanks to the co-operation between the Ministry of Science and CERN, the best Montenegrin students have the opportunity to attend the Student Summer School, be involved in the daily work of CERN's large research teams that carry out interdisciplinary research, as well as to attend lectures, visit laboratories and facilities and use sophisticated scientific equipment. The summer school in CERN is held every year for 8 weeks in July and August and includes theoretical training, participation in workshops, seminars, exhibitions, as well as experimental work. In this way, students gain in-depth knowledge of physics and technical sciences from experienced CERN lecturers. During 2017, the participation of 2 students from Montenegro in the school was financed. A new call for 2018 was announced in December.

"CERN's summer school has allowed me to learn more about working in large multinational groups at one of the world's largest experiments. In addition, getting to know and socializing with students from around the world really makes CERN the most preferred place to spend the summer for people in my profession", said Jelena Mijušković, one of the students of the summer school.

After her participation in the summer school in 2015, another student from Montenegro, Milena Vujanović, got great work opportunities in CERN, and in 2017 she was selected as a Marie Skłodowska-Curie actions fellow at the University of Liverpool, where she continued her research work through a prestigious training programme for young researchers. "When I went to CERN as a student of the Faculty of Science and Mathematics from Podgorica for summer practice within the Summer Student Programme, I received an invitation from an antimatter expert, Dr. Michael Doser, to return to CERN to conduct a fundamental research in this field on his project during the period of six months. However, when I started working on the project, I conducted measurements that significantly helped the development of the experiment. Shortly thereafter, I was put in charge of an entire system that is a key part of the experiment. Therefore, and because of the fact that there are not many people who could do the job I did, my contract was extended and instead of six I actively participated in the experiment for 15 months."

>> PUPILS AND STUDENTS SHOW RESEARCH APPROACH TO LEARNING

During the Science Open Days festival, the first Show of Pupils' and Students' Research Projects was organized, through which we promoted research education, the talents of young people and the work of their teachers. More than forty pupils and students from 12 teams from schools and faculties all over Montenegro presented the results of their research projects, where they showed vast knowledge, understanding of concepts in various fields of science, presentation skills, team work, and problem solving skills and self-confidence.

>> VOLUNTEERS OF THE STUDENT ORGANIZATION “BEST” AT THE SCIENCE DAYS (ART@CMS)

BEST volunteers for the Newsletter: “The volunteers of our organization were pleased to accept the invitation of the Ministry of Science to contribute to the realization of the Art@ CMS exhibition.

We found ourselves in the role of scientists for the first time and worked on experiments during the exhibition together with elementary and secondary school students, having the opportunity to share our knowledge in the field of physics with the exhibition visitors. It was kindergarten kids who were particularly intrigued with exhibits and who asked the most questions, showing interest to become scientists one day.

Contact with high school students was of great importance for us because it enabled us to better understand their generation and create special content for them during our next event, the Day of Engineers.”

>> THE FIRST INTERNATIONAL MASTERCLASS **HANDS ON PARTICLE PHYSICS**

For the first time in Montenegro, in March 2017, the international programme “Masterclasses – Hands on Particle Physics” was organized, in which fourth-grade students of the secondary vocational schools and gymnasia from Podgorica, Nikšić, Pljevlja, Bar and Cetinje took part. They had a unique opportunity to engage in data analysis and particle identification based on experimental events recorded on experiments in CERN and to get to know more about real research life in one of the most attractive areas of particle physics, the Large Hadron Collider. Through a virtual visit to CERN, the students also had the opportunity to see what the machines, facilities, and researchers’ working days looked like, being able to ask questions about the challenges the researchers faced in their daily work.

>> YOUTH ANSWERS TO EUROPEAN FOOD SYSTEM PROBLEMS

Master's student of the Biotechnical Faculty, Stefan Vuksanović, was informed about the competition of the European Institute of Innovation and Technology (EIT) – the Food Entrepreneurship Winter School through the website of the Ministry of Science. He applied for the competition and was selected as part of the group of 30 young Europeans to participate in an intensive three-week programme for young food professionals. The Ministry supported his travel. Stefan gladly shared his impressions with us.

How was work organized during the Winter School?

We spent the first week at the Technical University of Munich (TUM), the second at the University of Cambridge, which was organized by the European Institute of Innovation and Technology (EIT), the Center for Digital Technology and Management (CDTM) and the Queens University of Belfast. The issue of the problem of the European food system was a mission, and the process would start with problem identification, after which we would find ideas and develop the business. We presented the final presentations at the British Antarctic Survey in Cambridge, in front of a commission consisting of representatives of PepsiCo, the University of Cambridge, the Queens University of Belfast, the CDTM, the TUM, and the EIT. The Winter School included a great variety of content: lectures, group work, visits to PepsiCo, visits of founders of start-ups that transformed into enterprises or were on that path (Agrilution, Nufood, Entomics, Grillido, Acrai and Freshdetect), visits to museums, getting to know about culture and tradition of Cambridge and Munich.

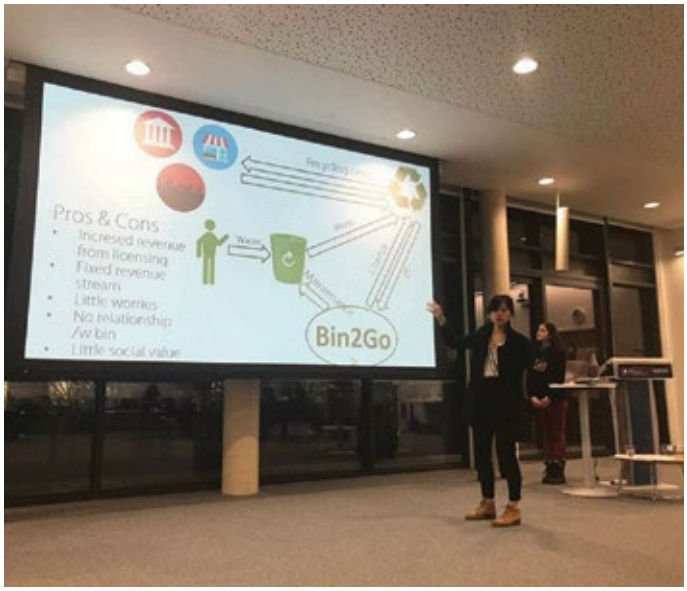
What challenges have you identified in the food system as crucial for the future of Europe and the world?

The problem of food production in water-scarce regions, food and plastic waste that pollute the environment, poor participation of small farmers on the market, the problem of poor quality and unsafe food, and the problem of food scarcity that mankind will face due to population increase.

What solutions have you suggested?

We were divided us into 5 groups that dealt with different themes. We mostly focused on the following problems that resulted in 5 start-up projects:

AquaInbox – an online platform that offers a wide range of water use, technology and consulting services for small and medium-sized farmers, helping them grow food in scarce water regions.
Foodi – an online store that provides small farmers with the opportunity to sell their products to dealers, giving them a direct connection, and thus increasing revenue.
Choise app – a mobile application that helps you make healthier choices in nutrition.
HeLiCa (The Healthier Life Card and App) – encouraging low-income families to buy and consume healthier foods in the stores, using the HeLiCa card and application.
Bin2Go – a smart recycling bin, set up in public places, that helps everyone who wants to recycle their plastic waste and get money in return.



By organizing info days, workshops and individual consultations, the Ministry of Science seeks to inform all stakeholders about the numerous scholarship opportunities – offered through EU programmes, calls for seminars and student schools. All information is also available through the website of the Ministry of Science and social networks. (http://www.mna.gov.me/, Facebook / Twitter)

Would it be possible to found a start-up from the ideas and do you have such plans?
Start-ups can be transformed into businesses. This is illustrated by the examples of many companies (Agrilution, Nufood, Entomics, Grillido, Acrai and Freshdetect), and their founders gave us useful tips on how to implement a start-up. I certainly plan to apply the knowledge and experience I gained at the winter school when setting up my own start-up.

What encourages you to take such a step and what do you see as limitations in Montenegro?
In particular, the start-up of Bin2Go (where I was one of the founders) is needed in Montenegro, both due to the need to resolve the problem of plastic waste and to protect the environment. However, we encounter the limitations present in Montenegro already at the beginning of the application of this start-up, and these include the lack of recycling centres, inadequate waste management in comparison to the countries of the West, insufficiently developed awareness of the population about recycling. Individuals and the state should be involved in solving this problem. I believe that with sufficient investments and raising awareness of the people, such a company could operate in Montenegro in the near future.

Anything else about the School?
I have learned a lot from industry experts about the challenges and potentials of the European food system. I have acquired skills in creating business, product development and market research, which is the best product of the EIT Winter School. I had a unique opportunity to study at the University of Cambridge and the Technical University of Munich, as well as to follow the lectures of prominent professors from these universities. Also, I find very helpful the advice and conversations with career and education trainers. Finally, equally important is that I have made contacts and friendships with people from all over the world.

Through various forms of support, the Ministry of Science encourages and promotes scientific activities in schools, such as the Discussion with the astronauts of the Primary School "21 May" from Podgorica and the LEGO League competition, organized by NGO "Young Inventors".

>> SUPPORT AND CO-OPERATION PROJECTS WITH NGOS

In 2017, within its regular programmes and public calls, the Ministry of Science funded 16 NGO projects in the field of science and innovation promotion, worth around EUR 17,000. Some of the partners from the NGO sector have prepared programmes within the Science Open Days festival, which is an important framework for co-operation between our Ministry and the civil sector. Under the IPA – Human Resources Development Programme, three NGO projects worth around EUR 70,000 were funded, while three more NGO projects worth EUR 49,000 were funded through a call for funding of scientific projects under H2020 and COST.

>> SCIENCE OPEN DAYS

The Ministry of Science has been organizing the Science Open Days festival for seven years now, with a view to popularizing science in society in an educational and interesting way. The thematic framework of this year's festival was "science and art", and therefore the central programme included an interactive exhibition of artists and scientists from CERN, Art@ CMS. Montenegrin artists accepted the challenge of presenting scientific projects from Montenegro in an artistic way for the first time.

>> SCIENCE AND US

With his inspiring speeches in 2017, Prof. Saša Popović made a significant contribution to the Economic Conference of Montenegro, as well as to the celebration of the UNESCO's World Science Day. This is his contribution to the Newsletter of the Ministry of Science.

The media recently announced that Chinese scientists successfully cloned two monkeys, making an important step towards the ability to clone humans. "Not everything that is possible is right", said Vincenzo Paglia, President of the Pontifical Academy for Life. While science seeks to create new life, some believe that science works against life. What are Mr. Paglia and others afraid of? That the cloning process could be out of control? That the development of science goes faster than the development of morality? Or that by these experiments, man interferes with the authority of God? In one way or another, the fruits from the tree of knowledge are bitter. Science has gone far and the fate of mankind depends on it. It has long enabled the movement of a finger to destroy life, and today, probably, the whole world.

In these circumstances, it is necessary to re-examine the meaning of the concepts we rely on in defense of the teleology of the scientific method, such as: progress, prosperity, humanity. "The current paradigm is based on the ideological premise of development", says Jonathan Granof. Development must enable prosperity for all, just as democracy gives equal voting rights to everyone. A new concept of development, known as sustainable development, is not a science of limited resources. It is, in fact, a science of limited human capabilities. A science of the inability of humans to adapt their way of life to the available natural resources.

The scientific method remains the only legitimate method of truth discovery. But the sources of ideas, creativity, visions, talents, which are the basics of inventiveness, remain deep in the human (sub) consciousness and it is difficult for science to model them. Thanks to these sources, genetic engineering, artificial intelligence and quantum technologies will become determinants of the future. However, this can "raise the tension between privacy, freedom and security", says Sir Martin Rees. We may be wrong when we say "artificial intelligence". It is, in fact, natural intelligence that has been transformed into a machine code. What the machines of the future will need will be ethical algorithms different from those within us. These have proven to lack resistance to corruption, greed, aggression.

Some development projects, worldwide and in our country, seem so futuristic that they cause mistrust from the outset. When everything that is possible is not right, why should not everything that is right be possible? The fruits from the tree of knowledge are bitter, but those from the tree of ignorance are even more so.

UNESCO's World Science Day
Since 2002, UNESCO's World Science Day for Peace and Development has been traditionally celebrated in many countries around the world. In Montenegro, the occasion was marked through the lecture of Prof. Saša Popović titled "On Economy and Democracy" at the Faculty of Economics and the lecture of Željko Ulip on Modern Satellite Technologies at the Faculty of Electrical Engineering of the University of Montenegro.

The year ahead of us, the second year of my mandate as the minister of science, is full of important plans on the realisation of recently adopted Strategy of Scientific-research Activities. From the very start of the year we began with preparation the innovated annual Call for co-financing scientific-research and innovation activities, which shows our intention towards a more open science. This is evident by giving support to publishing in open access journals and editing domestic journals of this type. We are also more open towards young researchers for the needs of their mobility into renowned international scientific institutions. We include again, this time with higher requirements on the side of realization, support to innovators who have protected their patents and innovative solutions.

A series of important steps on the project of the establishment of the International Institute for Sustainable Technologies is expecting us, even more demanding than last year. Already in May, the Declaration of Intent will be upgraded to the Memorandum of Understanding of the participating countries, the signing of which is planned under Bulgarian Presidency of the EU. Applying for the H2020 project for the development of the general design will follow, accompanied by creation of two training programmes for future leaders of the Institute. In parallel, candidates for location of the Institute will prepare their candidatures, where Montenegro and our local governance units need to show decisiveness and serious approach.

As it was explained in this Bulletin, the Government has shown higher confidence in us by increasing the budget aimed to our users, so that we will be in the position to open several new calls for scientific and innovative projects. The focus will be on the increase of the number of researchers by employment of young doctoral students or PhD holders in different organisations, as well as on the development of new products and services with high knowledge content, which would be brought close to the market. In that domain, cooperation between organisations from various sectors is required (faculties, companies and even civil society organisations).

In the field of strengthening of technological and innovative capacities of our economy, the role of science and our Ministry is unavoidable. Through the support from IPA, pre-accession funds, we will equip two laboratories in the Innovation-Entrepreneurial Centre Tehnopolis in Niksic, which will give additional power to the creation of new ideas, products and services and to the improvement of existing businesses. We also have in plan the development of general design of the central unit of Science-Technology Park in Podgorica, as the future nucleus of the innovation ecosystem of our country.

I would also like to extract a project which has been approved to us by the European Commission, and that is the development of the National programme for the creation of ecosystem for support to startups in Montenegro. Within this project we will have expert assistance on a high level, but moreover, we expect intensive dialogue and cooperation of stakeholders in our country – different ministries, grassroot start-up communities, businesses and associations.

Of course, we will continue to work on the promotion and support to the participation in EU Research and Innovation Programme, Horizon 2020, where I hope that our country will have several successful projects this year as well.

Minister of Science
Sanja Damjanović, PhD

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