Foreword by BIO-ICT Project Director Prof Igor Đurović, Phd

Dear Colleagues,

Upon the completion of the first year of successful implementation of the project - BIO-ICT Centre of Excellence, it is my pleasure to share with you the first issue of our Newsletter, with reference to what has been done so far, as well as to what we are expecting in the forthcoming period.

The first year is characterised by hiring new team members and project sub-teams were formed for a dozen of research topics. Commercialisation of scientific papers and transfer of technologies to the commercial entities is high on our agenda. Young researchers are trained to invest their significant efforts into the practical application of their knowledge in industry.

While equipment amounting to around 1.5 million Euros is being slowly delivered to our laboratories, we are more than eager to establish Centre for Data Acquisition, which is going to take place next year. This centre will be a link between the Faculty for Electrical Engineering of the University of Montenegro and the BIO-ICT Centre with at least three locations wherein experiments will be conducted in the areas of agriculture and bio-monitoring, which will represent the so-called 'open air laboratories' and an important step forward in the infrastructure of our country.

By gathering four excellent Montenegrin research institutions, two excellent small enterprises in the areas of agriculture and fish and mussel farming, as well as two important international institutions, so as through cooperation, in the framework of international projects, with more than 100 other entities, we are exploring possibilities of cooperation with other institutions through various future funding schemes.

Should you consider our partnership as valuable for applications for international projects,

If access to our current and future facilities may be of your interest,

If you believe you could use our knowledge and skills, or

If you think your expertise could contribute to our endeavours,

We are looking very forward to your proposal for cooperation, through both scientific projects and activities related to the commercialisation of scientific knowledge and technology transfer to commercial entities.

BIO-ICT Centre of Excellence Newsletter No. 1

BIO-ICT Centre of Excellence is the first Centre of Excellence in Montenegro, implemented as a three-year research programme led by the Faculty of Electrical Engineering (University of Montenegro), financed by the Ministry of Science of Montenegro through a World Bank loan from June 2014. Partners on the project are three leading Montenegrin research units from the University of Montenegro: Biotechnical Faculty, Institute for Marine Biology, Institute of Public Health; two international universities: St. Petersburg Scientific Research Centre for Ecological Safety and Centre for TeleInFrastruktur

(CTIF); and two successful Montenegrin SMEs companies: COGI doo and Green House Jovović doo.

During the First Year of our Project numerous activities have been realised: Kick-off meeting; Management and Scientific and Advisory Boards Meetings; Scientific Research; Trainings, Seminars and Lectures; Establishing partnerships; Purchasing equipment; Renovating Laboratories tenders; Plans for capacity building; Visits to partners; Hiring staff; New projects applications; IP and Sustainability plans; Dissemination etc.

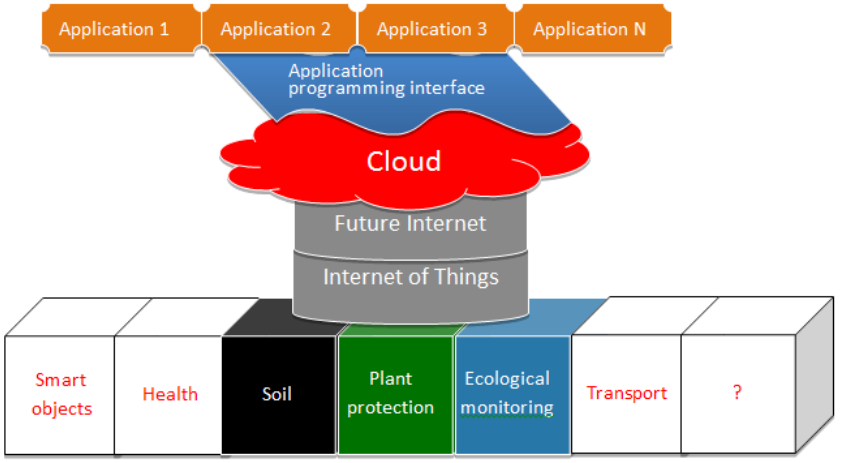
BIO-ICT CoE aims at developing modular and state-of-the-art ICT platform in the areas of sustainable agriculture, monitoring of crops, forest and water/sea ecosystem, development of techniques for controlling and reducing air pollution, analysis and standardization of food products, control of land quality, and improvement in the public health area. This research platform will be scalable and service oriented with potential to be utilized not only in agriculture, marine biology and environmental monitoring, but also in health, transportation, energy and other potential areas of smart objects usage.

The BIO-ICT research platform will reach state-of-the-art research and innovation level, lower investment cost, automatisation, guaranteeing user-independence, service adaptation according to user preferences and end-device capabilities, integration of domain specific services, etc.

BIO-ICT Research Activities

New BIO-ICT research platform aims at boosting the application and using the latest ICT technologies within agriculture, marine biology and environmental monitoring. Delivering cutting edge research results and innovation will increase competitiveness of the BIO-ICT consortium in ERA (European Research Area). Food production, monitoring devices, advisory system, research capacities and expert systems will be integrated. Critical mass of end users interested in high technologies and science-based innovation will be increased.

The BIO-ICT research platform will be further developed and validated through three pilot research facilities and three main research directions of BIO-ICT project. BIO-ICT team intends to implement Internet of Things (IoT) sensing environment. Data obtained from IoT nodes have to be transferred by new network as testbed for Future Internet research. Collected and transferred data will be stored in databases and analyzed by state-of-the-art data mining techniques. BIO-ICT cloud system will be established in order to support not only this project but also to be infrastructure for future research initiatives. Collected data will be used for providing intelligent services that will integrate for example: opinion (rating of the system), recommendation (personalized suggestions to the users) and social network.



BIO-ICT research activities during the first year are divided in three phases. During the first phase, the activities were focused on literature and state-of-the art survey and preliminary research based on current equipment. In the second phase, new equipment procurement, establishing of new research facilities, improving current laboratories, development of cloud system and IoT resources are planned. The third phase covers data collection and analysis, creation of API and user applications and high level view of the BIO-ICT system architecture.

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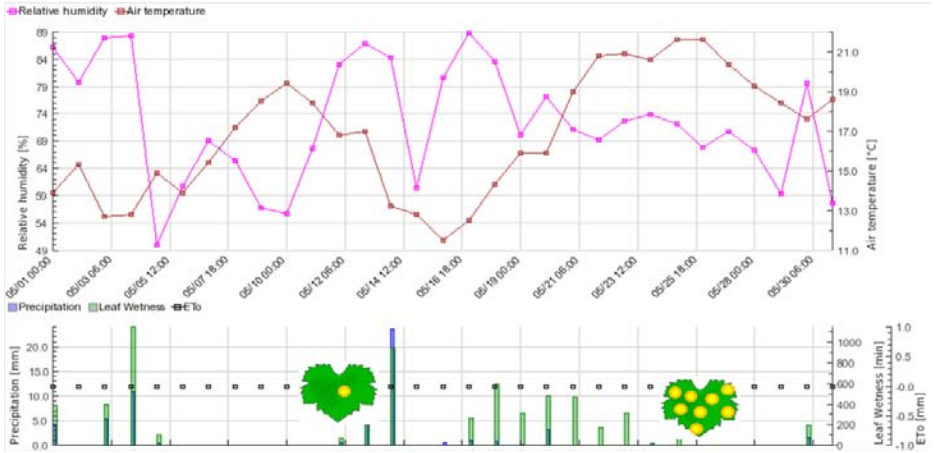
ICT & Agriculture

Biotechnical Faculty and Faculty of Electrical Engineering together with Green House Jovović doo work on establishing digital farming (precision agriculture) in Montenegro through development of cutting-edge ICT smart technologies in agriculture. Scientific research is divided into two groups: Soil and Plant protection.

Main activities of soil protection include analysis of irrigation and fertilization effects on quality and quantity of yield, creation of algorithm for software solution in Irrigation and Soil Fertilization as well as creation and monitoring of efficient irrigation system on farmer facility (GHJ). Plant protection group deals with forecasting of grapevine diseases and testing the resistance of plant pathogenic fungi to fungicide. Experiments are being set-up at the Biotechnical Faculty Experimental Field and their partners' facilities in Zeta and Spuž, as well as at GHJ Experimental Field.

Three weather stations (Vantage Pro2, Davis Instruments) were installed at three different locations on 6 March 2015. Data collected from the weather stations will be used for further BIO-ICT research and analysis and use at the Faculty of Electrical Engineering laboratories. We are in the process of establishing a data collection and processing centre at the Faculty of Electrical Engineering in order to make proper decisions related to agricultural production and biomonitoring.

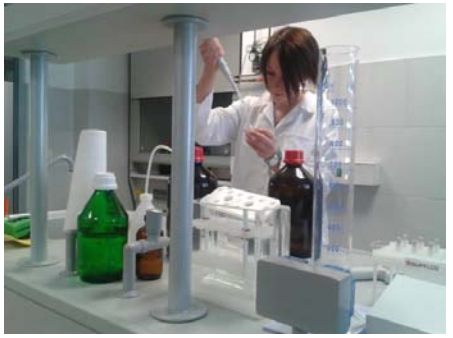


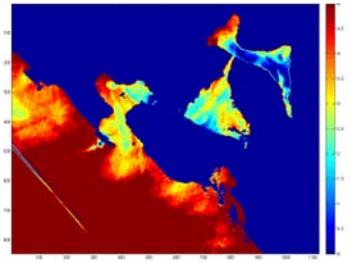
ICT Ecological Monitoring

Institute for Marine Biology, together with Faculty of Electrical Engineering, Institute of Public Health, COGIMAR doo and St. Petersburg Scientific Research Centre for Ecological Safety of the Russian Academy of Sciences is dedicated to scientific research and analysis in biomonitoring.

The work has been focused on monitoring of the see water condition by using sensor networks and data coming from shells, physical and chemical characteristics of seawater, sediment and mussels, qualitative and quantitative composition of phytoplankton and microbiological and sanitary analysis of water. These samples are being stored and analysed at the Institute for Marine Biology and Institute of Public Health laboratories.

Thirteen field trips have been completed at the open sea, COGIMAR fish farm and at the IMB in order to do analyses of integrated, multitrophic cultivation of mussels (Mytilus galloprovincialis). Field works were also carried out, within the activities of mussel (Mytilus galloprovincialis) and fish (sea bream - Sparus aurata and sea bass - Dicentrarchus labrax) sampling on COGIMAR fish and shellfish farm and mussel sampling on SVETA NEĐELJA mussel farm.





ICT biomonitoring experiment on land pollution impact was carried out for preliminary evaluation of eligibility of Landsat 8 data on the quality of water and concentration of Chlorophyll a along the Montenegrin coastline.

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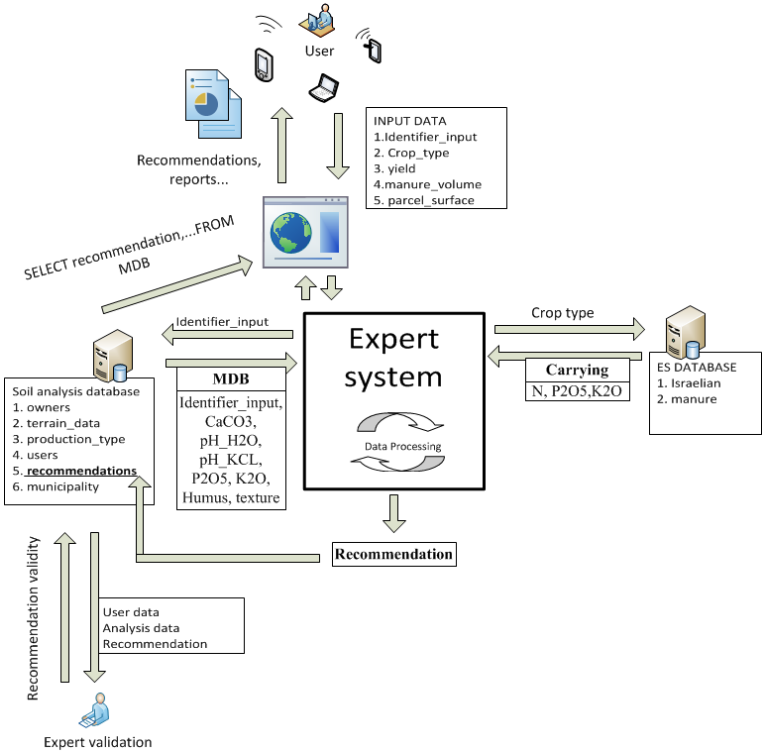
BIO-ICT Goals and Next Steps are oriented towards: development of new scientific approaches and methods for improving relevant products and services, strengthening of interdisciplinary research in Montenegro, more intensive cooperation with international research entities and private sector, improving potential for creating commercial innovations, establishing strong links between knowledge, research and innovations, fostering new generation of science-technology talents and attracting external funding streams through commercialization of knowledge and intellectual property.



For More Information on BIO-ICT Centre of Excellence, please find us on:

www.bio-ict.ac.me