VIRAL project presents

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Poštovani,

Kada smo pre manje od godinu dana uvodnim sastankom zvanično započeli realizaciju Erasmus+ projekta VIRAL (Vitalising ICT Relevance in Agriculture Learning) nismo ni slutili da će njegov akronim u potpunosti opravdati način implementacije. Pandemija izazvana pojavom virusa SARS-CoV-2 u potpunosti je promenila naše živote i način rada. Upotreba informativno-komunikacionih tehnologija (IKT) prešlo je u našu svakodnevnicu. Konferencije, treninzi, obuke, sastanci i sve drugo za šta smo smatrali da je teško raditi virtuleno, postalo je izvodljivo, pa čak i veoma prihvatljivo. Prilagodili smo se, promenili, naučili i postali svesni značaja upotrebe novih tehnologija. IKT su postale veoma značajne u savremenom načinu života i komunikaciji. IKT su veoma značajne i u poljoprivrednoj proizvodnji. Uloga IKT u poljoprivredi je poslednjih godina znatno porasla i razmerom i područjem primene. Proširenje opsežne povezanosti, sve veća primena „interneta stvari" (IoT), poboljšana analitika, pristupačniji uređaji i inovativne aplikacije, osnova su onoga što danas nazivamo digitalnim društvom.

Ovaj zamah pruža učesnicima u poljoprivrednom sektoru mogućnosti da se prilagode i primene ove tehnologije kao rešenja za modernu poljoprivredu. Iskorištavanje napretka i inovacija u IKT-u postaje sve značajnije dok tražimo načine za ublažavanje nekih izazova s kojima se suočava poljoprivreda, u svetu u kojem moramo proizvesti 60 posto više hrane do 2050 (FAO, 2017). Primena rešenja u modernoj poljoprivredi može transformisati način na koji pristupamo izazovima, delovati kao instrument promene u ovom sektoru i pomoći nam da doprinesemo postizanju svetskih ciljeva održivog razvoja. Danas IKT predstavljaju ogromnu priliku za ruralno stanovništvo da poboljša svoju produktivnost, poveća sigurnost proizvodnje hrane, pristupi tržištima i pronađe mogućnosti zaposlenja u obnovljenom ruralnom sektoru. Upravo mogućnostima primene IKT u sektoru agrara, saradnjom univerziteta i poslovnog sektora uz povećanu upotrebu IKT širom agro-zajednica zapadnog Balkana bavi se projekat VIRAL. Koliko smo u tome do sada uspeli, šta smo uradili i dokle smo stigli, želimo da Vas informišemo u prvom broju biltena, čija je priprema rezultat rada članova konzorcijuma projekta i njihovih saradnika iz različitih oblasti poljoprivrede. Osim upoznavanja sa projektom, aktivnostima i rezultatima, predstavljamo različite uspešne i praktične primere upotrebe IKT u poljoprivredi.

Predstavljamo uspešne kompanije, pojedince, organizacije i institucije iz bližeg i daljeg okruženja, koje uveliko primenjuju IKT u poljoprivredi za dobrobit svih. Kao što kaže naš kolega Jurij (u jednom od tekstova u ovom broju) promena paradigme u poljoprivredi se već odavno dogodila. Otvaraju se nove mogućnosti za efikasnije, produktivnije i, u mnogim aspektima, održivo upravljanje poljoprivrednim gazdinstvima. U budućnosti poljoprivrede, nove tehnologije neće biti pitanje, već odgovor na suočavanje sa različitim izazovima.

U nadi da ćete nam se pridružiti i da ćemo sledeće godine imati prilike da više sarađujemo i „off-line" a ne samo „on-line", iskreni pozdravi.

Dear all,

When we officially started the implementation of the Erasmus+ project VIRAL (Vitalising ICT Relevance in Agriculture Learning) less than a year ago, we had no idea that its acronym would fully justify the method of implementation. The pandemic caused by the appearance of the SARS-CoV-2 virus has completely changed our lives and the way we work. The use of information and communication technologies (ICT) has become part of our everyday life. Conferences, trainings, educations, meetings and everything else that we thought would be difficult to perform virtually became feasible and even very acceptable. We have adapted, changed, learned and become aware of the importance of using new technologies. ICT have become very important in the modern way of life and communication.

ICT are also very important in agricultural production. The role of ICT in agriculture have grown substantially in recent years in both scale and scope. Expanding broadband connectivity, increasing deployment of the "internet of things" (IoT), enhanced analytics, affordable devices and innovative applications are underpinning what we now call a digital society. This momentum provides stakeholders in the agricultural sector with opportunities to develop, adapt and apply these technologies as e-agriculture solutions. Taking advantage of ICT advancements and innovations is becoming more critical as we look for ways to offset some of the challenges faced by agriculture in a world where we must produce 60 percent more food by 2050. Applying e-agriculture solutions can transform the way we approach these challenges, act as an instrument of change in this sector, and help us contribute to the achievement of the world's Sustainable Development Goals. Today, ICT represents a tremendous opportunity for rural populations to improve productivity, to enhance food security, to access markets, and to find employment opportunities in a revitalized rural sector.

The possibilities of applying ICT in the agricultural sector, cooperation between universities and the business sector with increased use of ICT throughout the agro-communities of the Western Balkans are among the main goals of VIRAL project.

Which goals have we accomplished so far, what was done and how far have we reached, all these questions we strive to answer in the first issue of the bulletin, whose preparation is the result of the work of project consortium members and their associates from different fields of agriculture. In addition to encounter with the project, its activities and results, we present various successful and practical examples of the use of ICT in agriculture. We represent successful companies, individuals, organizations and local and regional institutions, which widely apply ICT in agriculture for the common benefit.

As our colleague Jurij said (in one of the articles in this issue), the paradigm shift in agriculture has long since taken place. Opportunities are opening up for a more efficient, more productive, and in many aspects, even sustainable management of farms. New technologies will not be a question in future agriculture, but an answer to confronting the challenges.

In the hope that you will join us and that next year we will have the opportunity to cooperate more „off-line" and not just „on-line", sincere greetings.

Miljan Cvetković

SADRŽAJ / CONTENT

Nove tehnologije kao odgovor na izazove poljoprivrede

New technologies in response to agricultural challenges

Technological change in the modern age is inevitable. To progress, any sector or industry is increasingly dependent on advanced hardware and software solutions. The situation is similar in the agricultural sector, which has undergone remarkable transformations since 1900. Transformations and modernizations have brought significant advancements and various new perspectives in this sector. The first revolution happened in 1920, marked primarily by agricultural mechanization with a significant increase in efficiency, productivity, and the facilitation of direct manual labour.

In the early 1960s, the agricultural sector experienced the so-called 'Green Revolution' with the increasing use of high-yielding varieties, chemical fertilizers, agrochemicals, and advanced irrigation methods. There were positive economic results. The agricultural sector seemed to have reached its optimum, at least in terms of productivity, due to new, more intensive farming methods and the global availability of resources.

Despite the impressive Green Revolution results, there were significant problems due to the excessive and uncontrolled consumption of raw materials, resulting in agricultural land degradation

Tehnološke promjene u modernom dobu su neizbježne. Da bi napredovao, bilo koji sektor ili industrija sve više zavise od naprednih hardverskih i softverskih rješenja. Slična je situacija i u poljoprivrednom sektoru, koji je pretrpeo izuzetne transformacije od 1900. godine. Transformacije i modernizacije donijele su značajan napredak i brojne nove perspektive u ovom sektoru. Prva revolucija dogodila se 1920. godine, a karakteriše je prije svega pojava poljoprivredne mehanizacije, sa značajnim povećanjem efikasnosti, produktivnosti i olakšavanja direktnog ručnog rada.

Početkom 1960-ih, poljoprivredni sektor je doživio takozvanu „Zelenu revoluciju" sa sve većom upotrebom visokorodnih sorti, hemijskih đubriva, agrohemikalija i naprednih metoda navodnjavanja. Bilo je i pozitivnih ekonomskih rezultata. Činilo se da je poljoprivredni sektor dostigao svoj optimum, barem u pogledu produktivnosti, zahvaljujući novim, intenzivnijim poljoprivrednim metodama i globalnoj dostupnosti resursa.

Uprkos impresivnim rezultatima Zelene revolucije, bilo je značajnih problema zbog prekomerne i nekontrolisane potrošnje sirovina, što je rezultiralo degradacijom poljoprivrednog

and environmental pollution. It is now time for new changes that will solve productivity and efficiency and the issues mentioned above. Precision agriculture is considered a vital component of the third wave of the modern agricultural revolution.

This concept is a collective term of new production and management techniques in agriculture. The birth of precision agriculture has often been linked to the introduction of GIS technology. A few years later, with the implementation of GPS technology and yield mapping. Today, precision agriculture also includes various sensors, devices, machines, robots, UAVs, and sensing technology. These advanced devices and methods provide detailed information on environmental conditions, crop, and soil status to allow accurate control of inputs to prevent diseases, weeds, and unnecessary losses. In recent times, we also often hear 'Smart Agriculture' or 'Agriculture 4.0', which are terms for the next big trend facing the industry, including a greater focus on precision agriculture.

zemljišta i zagađenjem životne sredine. Sada je vrijeme za nove promjene koje će riješiti probleme produktivnosti i efikasnosti i gore pomenuta pitanja.Precizna poljoprivreda smatra se vitalnom komponentom trećeg talasa moderne poljoprivredne revolucije.

Ovaj koncept je skupni pojam novih proizvodnih i upravljačkih tehnika u poljoprivredi. Pojava precizne poljoprivrede često se povezivala sa uvođenjem GIS tehnologije. Nekoliko godina kasnije, povezuje se sa primjenom GPS tehnologije i mapiranjem prinosa. Danas, precizna poljoprivreda takođe uključuje razne senzore, uređaje, mašine, robote, bespilotne letelice i senzorsku tehnologiju. Ovi napredni uređaji i metode pružaju detaljne informacije o uslovima okoline, usjevima i osobinama zemljišta, kako bi se omogućila kontrola imputa, a u cilju spriječavanja pojave biljnih bolesti, korova i nepotrebnih gubitaka. U novije vrijeme, često čujemo i pojmove „pametna poljoprivreda" ili „Poljoprivredu 4.0", što označava sljedeći veliki trend sa kojim se suočava industrija, a uključuje i veći fokus na preciznu poljoprivredu.

Researchers around the world estimate that new technologies in agriculture have a great potential. It is no different in Europe, where precision agriculture and the integration of various advanced technologies are set to become the most influential trends. A growing number of farmers are starting to adopt these technologies to run on their farms. There is also a lot of research and projects going on in this area.

One such project is the Central European project Transfarm 4.0 (a total of 10 partners from Austria, Hungary, Italy, Poland, and Slovenia), funded by Interreg Central Europe program.

The project intends to address the issue of technology transfer towards farming businesses in Central European regions characterized by different degrees of technology intensity in their agricultural practices.

Istraživači širom svijeta procjenjuju da nove tehnologije u poljoprivredi imaju veliki potencijal. Ništa drugačije nije ni u Evropi, gdje će precizna poljoprivreda i integracija različitih naprednih tehnologija postati najuticajniji trendovi. Sve veći broj poljoprivrednika počinje usvajati ove tehnologije za rad na svojim gazdinstvima. Takođe se u ovoj oblasti odvija puno istraživanja i projekata.

Jedan od takvih projekata je srednjoevropski projekat Transfarm 4.0 (ukupno 10 partnera iz Austrije, Mađarske, Italije, Poljske i Slovenije), koji je finansiran iz programa Interreg Central Europe. Cilj projekta je razmatranje pitanja transfera tehnologije prema poljoprivrednim preduzećima u srednjoevropskim državama, koje karakterišu različiti stepeni tehnološkog intenziteta u njihovoj poljoprivrednoj praksi. Tokom projekta, biće sprovedeno šest eksperimentalnih pilot projekata, sa fokusom na tri specifična područja: aplikacije podržane od ISOBUS-a, proksimalno očitavanje i korišćenje velikih podataka. U Sloveniji, u toku je razvoj pametnog sistema za nadgledanje i ocjenu

During the project, six experimental pilot projects will be implemented, focusing on three specific areas; ISOBUS supported applications, proximal sensing, and the use of big data. In Slovenia, we are developing smart canopy monitoring and evaluation system. This real-time system is intended to reduce the use of chemicals based on the readings from a LIDAR system, IMU unit, and a sensor for visual odometry. The sensors' readings are analysed by the embedded computer to precisely open or close the electromagnetic valves on the back of the machine. This pilot project aims to build a low cost, smart, and simple solution for canopy monitoring and plant spraying system.

One of the emerging technologies in precision agriculture is the application of robots in farming. The University of Maribor is a partner in the Italian EIP AGRI operational group, where the group completed two prototype autonomous robots, one based on RTK-GPS system and the other based on a sensor fusion approach to building a more robust version (Rovitis 4.0), supported by multiple sensory systems to support the autonomous application of plant protection products in vineyards. This makes it possible to automize all of the tasks a farmer on a tractor would typically be required to do.

The paradigm shift in agriculture has long since taken place. Opportunities are opening up for a more efficient, more productive, and in many aspects, even sustainable management of farms. New technologies will not be a question in future agriculture, but an answer to confronting the challenges.

Pripremio/Prepared by:
Jurij Rakun, UM

krošnji biljaka. Ovaj sistem u realnom vremenu namjenjen je smanjenju upotrebe hemikalija, a na osnovu očitavanja iz LIDAR sistema, IMU jedinice i senzora za vizuelnu odometriju. Očitavanja senzora analizira ugrađeni računar da bi se tačno otvorili ili zatvorili elektromagnetni ventili na zadnjoj strani mašine. Ovaj pilot projekat ima za cilj izgradnju jeftinog, pametnog i jednostavnog rješenja za nadzor krošnji biljaka i razvoj sistema aplikacije pesticida.

Jedna od novih tehnologija u preciznoj poljoprivredi je primjena robota u gajenju usjeva. Univerzitet u Mariboru je partner u italijanskoj operativnoj grupi EIP AGRI, u sklopu koje su kompletirana dva prototipa autonomnih robota, jednog zasnovanog na RTK-GPS sistemu, a drugog zasnovanog na pristupu fuzije senzora za izgradnju robusnije verzije (Rovitis 4.0), podržane od strane više senzornih sistema u cilju podrške autonomnoj primjeni sredstava za zaštitu bilja u vinogradima. Ovaj pristup omogućava automatizaciju svih zadataka koje poljoprivrednik na traktoru inače obavlja u praksi.

Promjena paradigme u poljoprivredi se već odavno dogodila. Otvaraju se nove mogućnosti za efikasnije, produktivnije i, u mnogim aspektima, održivo upravljanje poljoprivrednim gazdinstvima. U budućnosti poljoprivrede, nove tehnologije neće biti pitanje, već odgovor na suočavanje sa različitim izazovima.

Početak projekta VIRAL

Start of the VIRAL project

U drugoj polovini 2019. godine od ukupno 833 prijavljenih projekata u okviru Erasmus+ programa, Izvršna agencija za obrazovanje, audiovizualne sadržaje i kulturu Evropske komisije u Briselu (Education, Audiovisual and Culture Executive Agency – EACEA), odabrala je 163 projekta koja će direktno finansirati. Među njima se našao i projekat pod nazivom „Vitalising ICT Relevance in Agriculture Learning – VIRAL".

Projekat VIRAL je prvi prijavljeni projekat pod koordinacijom Univerziteta u Banjoj Luci, a u saradnji sa još 16 partnera iz 6 država.

In the latter half of 2019, out of 833 projects submitted within the Erasmus+ programme, the Education, Audiovisual and Culture Executive Agency of the European Commission in Brussels (EACEA), selected 163 it will finance directly. Among them is the project titled "Vitalising ICT Relevance in Agriculture Learning – VIRAL".

VIRAL project is the first project submitted under the coordination of the University of Banja Luka and in cooperation with 16 other partners from six countries.

O projektu

Opšti cilj projekta VIRAL je podrška saradnji univerzitetskog i poslovnog sektora podsticanjem upotrebe informaciono kumunikacionih tehnologija (IKT) kroz poljoprivredni sektor u zemljama zapadnog Balkana, kako bi se postigla željena integracija poljoprivrede i inženjerstva. Razvojem IKT šire se mogućnosti njihove upotrebe u poljoprivrednom sektoru, a samim tim se podstiče i olakšava održivost tog sektora.

Početkom 2020. godine započela je implementacija projekta organizacijom prvih aktivnosti – kick-off sastanka i uvodne konferencije projekta. Kick-off sastanak je poslužio za definisanje osnovnih načela rada na projektu, dinamiku aktivnosti u predstojećem periodu kao i za analizu najznačajnijih segmenata realizacije projekta.

About the project

The general goal of the VIRAL project is to support the cooperation of the university and business sectors by encouraging the use of ICT in the agricultural sector in the Western Balkan countries, in order to achieve the desired integration of agriculture and engineering. Development of ICT expands the ways to use it in agricultural sector, and consequently stimulates and facilitates the sector's sustainability.

Project implementation began in early 2020 with initial activities – kick-off meeting and the project's inception conference. The kick-off meeting was used to define the basic principles of working on the project, schedule of activities in the coming period, and to analyses the most important segments of the project implementation.

Za više informacija: http://viralerasmus.org/zapocela-implementacija-projekta-viral/

For more information: http://viralerasmus.org/en/viral-project-implementation-commences/

Partneri na projektu su:

Project partners are:

- Partneri na projektu su:
- Sveučilište u Mostaru, BiH; Univerzitet „Džemal Bijedić" u Mostaru, BiH;
- Univerzitet u Tuzli, BiH;
- Univerzitet Bijeljina, BiH;
- Univerzitet Donja Gorica, Crna Gora;
- Wageningen University & Research, Holandija;
- University of Maribor, Slovenija;
- University of Agronomic Sciences and Veterinary Medicine, Rumunija;
- Agro voće d.o.o., BiH;
- Jafa komerc d.o.o., BiH;
- 13. jul Plantaže a.d., Crna Gora;
- Institut za Zapadni Balkan, Srbija;
- Inovacioni i preduzetnički centar Tehnopolis, Crna Gora;
- Inovacioni centar Banja Luka, BiH;
- Zaklada za inovacijski i tehnološki razvitak, BiH i
- Udruženje za nove tehnologije Crne Gore, Crna Gora.

Project partners are:

- University of Mostar, BiH;
- Džemal Bijedić University, Mostar, BiH;
- University of Tuzla, BiH;
- Bijeljina University, BiH;
- Donja Gorica University, Montenegro;
- Wageningen University & Research, The Netherlands;
- University of Maribor, Slovenia;
- University of Agronomic Sciences and Veterinary Medicine, Romania;
- Agro voće d.o.o., BiH;
- Jafa komerc d.o.o., BiH;
- 13. jul Plantaže a.d., Montenegro;
- Western Balkans Institute, Serbia;
- Innovation and Entrepreneurship Centre Tehnopolis, Montenegro;
- Banja Luka Innovation Centre, BiH;
- Foundation for innovation and technology development, BiH, and
- Montenegro Association for New Technologies, Montenegro.

Pripremio/Prepared by:
Miljan Cvetković, UNIBL

IKT u poljoprivredi – realnost i potreba

ICT in agriculture – reality and need

Univerzitet u Banjoj Luci Poljoprivredni fakultet je u saradnji sa Ministarstvom poljoprivrede, šumarstva i vodoprivrede Republike Srpske i Akademija nauka i umetnosti Republike Srpske, 23.01. 20120. godine u okviru projekta VIRAL organizovao uvodnu konferenciju pod nazivom „Informaciono komunikacione tehnologije u poljoprivredi". U okviru konferencije su prikazana savremena dostignuća u oblasti primene IKT (informaciono komunikacionih tehnologija) u poljoprivredi.

University of Banja Luka, Faculty of Agriculture, in cooperation with the Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska and the Academy of Sciences and Arts of the Republic of Srpska, on January 23rd 20120, within the VIRAL project, organized an Introductory Conference entitled „Information and Communication Technologies in Agriculture". The conference presented modern achievements in the field of ICT application in agriculture.

Konferenciji je prisustvovalo više od 60 učesnika, među kojima je bilo predstavnika resornih ministarstva, velikih kompanija aktivnih u sektoru poljoprivrede, individualnih proizvođača, nastavnog osoblja, studenata i predstavnika drugih institucija. Konferencija je otvorila veoma značajnu temu za sektor agrara u Bosni i Hercegovini i omogućila povezivanje različitih učesnika u sektoru poljoprivrede. Za više informacija: http://viralerasmus.org/ict-u-poljoprivredi/

The conference was attended by more than 60 participants, including representatives of the ministries, large companies active in the agricultural sector, individual producers, teaching staff, students and representatives of other institutions. The conference opened a very important topic for the agricultural sector in Bosnia and Herzegovina and enabled the connection of various stakeholders in the agricultural sector. For more information: http://viralerasmus.org/ict-u-pol poljoprivredi/

Na konferenciji su predstavljene sledeće teme:

1. **"CARPO – program za predviđanje biljnih bolesti"** - Mirko Jokić dipl.ing. Ministarstvo poljoprivrede, šumarstva i vodoprivrede, Republike Srpske;
2. **"Dizajniranje poljoprivredno-prehrambenih sistema baziranih na internetu inteligentih uređaja"** - Bedir Tekinerdogan, Catal Cagaty, Univerzitet u Vageningenu, Holandija;
3. **"Precizna poljoprivredna elektronika i IKT tehnologija: primenjiva rešenja"** - Radovan Stojanović, Crnogorska asocijacija za nove tehnologije, Crna Gora;
4. **"Obrada signala u biohibridnim sistemima"** - Zdenka Babić, Vladimir Risojević, Univerzitet u Banjoj Luci, Elektrotehnički fakultet;
5. **"Odabrani primeri digitalizacije u poljoprivredi"** - Jurij Rakun, Fakultet za poljoprivredu i prirodne nauke, Univerzitet u Mariboru, Slovenija;
6. **„Primena IKT u vinogradarstvu i proizvodnji vina – aktivnosti u preduzeću "**13. Jul Plantaže" - Vesna Maraš, Tomo Popović, Jovana Raičević, Milena Mugoša, Vasilije Mirović, Katarina Pavićević, Sanja Radonjić, "13. Jul Plantaže" a.d., Podgorica, Crna Gora Fakultet za informacione tehlogije, Univerzitet u Donjoj Gorici, Podgorica, Crna Gora;
7. **„Mehanizacija i IKT u proizvodnji šljive - predstavljanje projekta"** - Cvetković Miljan, Univerzitet u Banjoj Luci Poljoprivredni fakultet.

The following topics were presented at the Conference:

1. **"CARPO – program for plant diseases prognosis"** - Mirko Jokić, Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska;
2. **"Architecting Internet of Things Based Agri-Food Systems"** - Bedir Tekinerdogan, Catal Cagatay, Wageningen University and Research;
3. **„Precision Agriculture Electronics and ICT Techniques: Feasible Solutions"** - Radovan Stojanović, Montenegrin Association for New Technologies (MANT), Montenegro;
4. **"Signal Processing in Biohybrid Systems"** - Zdenka Babić, Vladimir Risojević, University of Banja Luka, Faculty of Engineering;
5. **"Selected Examples of Digitalization in Agriculture"** - Jurij Rakun, Faculty of Agriculture and Life Sciences, University of Maribor;
6. **"Application of ICT in Viticulture and Wine Production – activities in the company "13. Jul Plantaže"** - Vesna Maraš, Tomo Popović, Jovana Raičević, Milena Mugoša, Vasilije Mirović, Katarina Pavićević, Sanja Radonjić, "13. Jul Plantaže" a.d., Podgorica, Montenegro, Faculty for Information Technologies, University of Donja Gorica;
7. **"Mechanization and ICT in Plum Production - project presentation"** - Cvetković Miljan, University of Banja Luka, Faculty of Agriculture.

**Pripremio/Prepared by:
Dragan Brković, UNIBL**

Studenti provode puno vremena na mreži

Radni paket 1 - Komparativna analiza i analiza potreba na temu upotrebe IKT u oljoprivredi

Students spend a lot of time online

Work package 1 - Comparative analysis and needs analysis related to the use of ICT in agriculture

Savremeno poslovno okruženje u poljoprivrednom sektoru jedna je od najizazovnijih profesija koje postoje. Da bi se udovoljilo sve održivijim orijentiranim zahtjevima potrošača i uspjelo u - vraćanju profita za ovaj poduhvat, mora se manipulisati biološkim procesima, iskorištavati povoljne klimatske prilike suočavajući se s većom učestalošću i ozbiljnošću nepovoljnih vremenskih događaja, te proizvoditi dovoljno sigurne hrane visokog kvaliteta na održivi način.

Kao dio planiranih aktivnosti u okviru RP 1, dva izvještaja će biti napravljena i objavljena. Prvi izvještaje, 1.1. aktivnost, ima za cilj upoređivanje univerzitetsko-poslovne saradnje u poljoprivredi na zapadnom Balkanu i zemljama EU i razvijanje preporuka za politiku. Drugi izvještaj, 1.2. aktivnost, fokusira se na analize potreba i mapiranje potencijala za prenos znanja.

Kako bi se prikupile potrebne informacije koje se odnose na situaciju u vezi sa upotrebom IKT u poljoprivredi, napravljena su anketna istraživanja za četiri različite ciljne grupe iz BiH, CG, SR i zemalja EU, Rumunije, Slovenije i Holandije.

Contemporary business environment in the agricultural sector is one of the most challenging profession that exists. In order to meet increasingly sustainable-oriented demands of consumer and succeed – returning profit for its endeavour, one must manipulate biological processes, exploit favourable climatic condition while facing higher frequency and severity of adverse weather events, and must produce enough safety food of high quality on sustainable way.

As the part of planned activites within WP 1, two reports are about to be made and published. First report, 1.1. activity, aims to compare university-business cooperation in agriculture in Western Balkans and EU countries and develop policy recommendations. The second report, 1.2. activity, focuses on needs analyses and map knowledge transfer potential.

In order to collect the necessary information relate to the situation on use of ICT in agriculture, surveys were made for four different target groups from B&H, MNE, SR, and EU countries Romania, Slovenia and Netherlands.

Budući da smo otkrili nedostatak suradnje, osim nekih najnovijih projekata koji se bave preciznom poljoprivredom, analiziramo dostupnost IKT-a, upotrebu IKT-a, vještine i iskustva i percepciju IKT- a među svim uključenim dionicima; nastavnici i studenti (akademska zajednica) i savjetnici i poljoprivrednici (biznis).

Konačna ideja je da se prikupljene informacije koriste za davanje zaključaka o politici i preporuka u cilju poboljšanja univerzitetsko-poslovne saradnje u poljoprivredi i generalno upotrebe IKT-a u poljoprivredi na zapadnom Balkanu i u EU.

Since we found a lack of cooperation, except some very recent projects addressing precision agriculture, we analyse ICT availability, use of ICT, skills and experiences and perception of ICT among all stakeholders involved; teachers and students (academia) and advisors and farmers (business).

The final idea is to use the collected information to provide policy conclusions and recommendations in order to improve university-business cooperation in agriculture and generally the use of ICT in agriculture in the Western Balkans and EU.
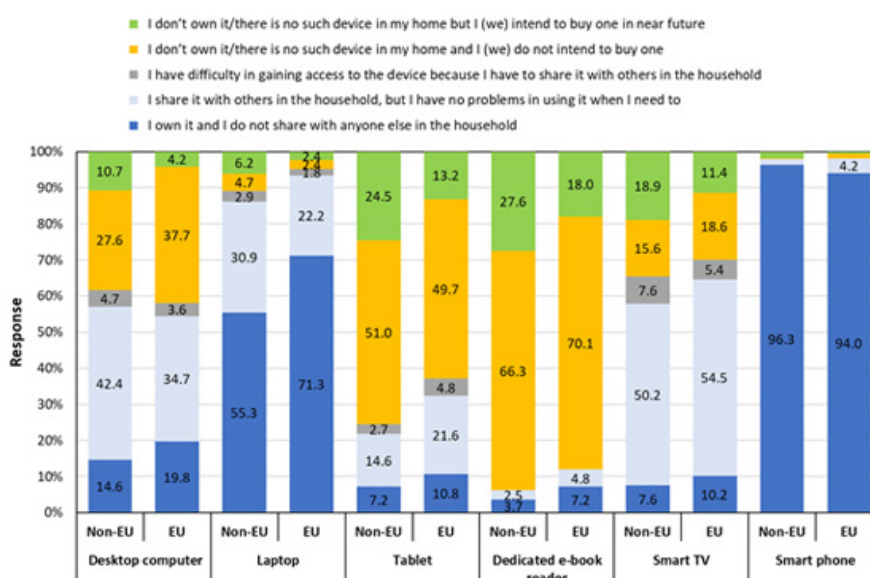
| **Rezultati anketa u akademskom okruženju (studenti)** | **Survey results in Academia (students)** |

Ukupno je anketirano 486 studenata (459 iz B&H i 27 studenata iz CGME) koji odgovorilo u grupi ciljnih država (ne-EU), a 167 studenata u grupi zemalja EU. Ženski pol blago preovladava u EU (58,1%), a muški pol (54,9%) u zemljama koje nisu članice EU. Studenti su uglavnom mlađi od 25 godina, upisani na dodiplomske programe (80,0% u zemljama koje nisu članice EU i 69,5% u zemljama EU).

In total, 486 students (459 from BA, and 27 students from ME) responded in the group of target counties (non-EU), and 167 students in the group EU countries. Women slightly predominate in EU (58.1%) and male (54.9%) in non-EU countries. Students are mainly aged less than 25 years, enrolled in the undergraduate programmes (80.0% in non-EU and 69.5% in EU group).

Legend:
- I don't own it/there is no such device in my home but I (we) intend to buy one in near future
- I don't own it/there is no such device in my home and I (we) do not intend to buy one
- I have difficulty in gaining access to the device because I have to share it with others in the household
- I share it with others in the household, but I have no problems in using it when I need to
- I own it and I do not share with anyone else in the household

Što se tiče pristupačnosti IKT-a, od studenata se tražilo da navedu da li posjeduju ili dijele (imaju pristup) sa spiska od šest tehnologija (stolni računar, prenosni računar, tablet, namjenski čitač e-knjiga, pametni TV i pametni telefon).

Regarding the accessibility of ICT, students were asked to indicate whether they own or share (have access) a list of six technologies (desktop computer, laptop computer, tablet, dedicated e-book reader, smart TV and smartphone).

Kao što Grafikon 1. pokazuje vlasništvo nad stolnim i prenosnim računarima veće je među studentima iz zemalja EU, ali obje grupe imaju pristup ovim tehnologijama. Osim što je pristup tabletu i namjenskom čitaču e-knjiga (kao Kindle) najniži među navedenim tehnologijama i od 50–70% ispitanika ne namjerava ih kupiti, također je vidljivo da je oko četvrtina ispitanika u zemljama izvan EU zemlje ih namjeravaju kupiti u bliskoj budućnosti. Preko polovine učenika (58% u zemljama izvan EU i 65% u zemljama EU) ima pristup pametnoj televiziji, dok je vlasništvo nad pametnim telefonom značajno (više od 90% u obje grupe).

As Figure 1 shows ownership of desktop and laptop computers is higher among students from EU countries, but both groups have access to these technologies. Besides the access to tablet and dedicated e-book reader (as Kindle) is the lowest among listed technologies and from 50–70% of respondents do not intend to buy them, it is also visible that about a quarter of respondents in non-EU countries intend to buy them in near future. Over one half of students (58% in non-EU and 65% in EU countries) have access to smart TV, while ownership of smartphone is extensive (more than 90 % in both groups).

Hours per week/ _Sati sedmično_	Time spent online _Vijeme provedeno online_		Time spent online for educational purposes _Vrijeme provedeno online u obrazovne svrhe_	
	Non-EU countries (N=486)	EU countries (N=167)	Non-EU countries (N=486)	EU countries (N=167)
<5	43 (8.8%)	15 (9%)	135 (27.8%)	51 (30,5%)
5–10	50 (10.3%)	29 (17.4%)	111 (22.8%)	60 (35.9%)
11–20	64 (13.2%)	47 (28.1%)	130 (26.7%)	34 (20.4%)
21–30	91 (18.7%)	37 (22.2%)	60 (12.3%)	15 (9.0%)
31–40	83 (17.1%)	13 (7.8%)	11 (4.7%)	5 (3.0%)
>40	154 (31.7%)	26 (15.6%)	26 (5.3%)	2 (1.2%)

Rezultati, Tabela 1., pokazuju da studenti provode puno vremena na mreži, posebno u zemljama izvan EU, gdje je polovina ispitanika rangirana u klaster 11–20, 21–30 i 31–40 sati nedeljno. Udio najoduševljenijih korisnika Interneta - onih koji su izjavili da više od 40 sati sedmično provode na mreži, među studentima je iz zemalja koje nisu članice EU - dvostruko veći (31,7%) od udjela studenata iz EU (15,6). Međutim, studenti obje grupe zemalja izjavili su da provode mnogo manje vremena na mreži u obrazovne svrhe.

Results, Table 1., indicate that students spend a lot of time online, especially in non-EU countries where a half of respondents is ranked into the cluster 11–20, 21–30 and 31–40 hours per week. The proportion of the most enthusiastic internet users – those who declared spending more than 40 hours per week online, is among students from non-EU countries – twice as high (31.7%) as is the proportion of EU students (15.6). However, students of both country groups declared to spend much less time online for educational purposes.

Za više informacija:
http://viralerasmus.org/#

For more information:
http://viralerasmus.org/en/home/

Pripremila/Prepared by:
Alisa Hadžiabulić, UNMO
Silva Grobelnik Mlakar, UM

CARPO – program za prognozu biljnih bolesti

CARPO – program for plant diseases prognosis

Prve aktivnosti Ministarstva poljoprivrede, šumarstva i vodoprivrede Republike Srpske koje se odnose na prognozno-izvještajni rad započele su 2014. godine a odnosile su se na postavljanje automatskih agrometeoroloških stanica u poljoprivrednim usjevima na teritoriji Republike Srpske.

Projekat je realizovan zahvaljujući podršci UNDP BiH. U periodu 201-2016. Na teritoriji Republike Srpske instalirano je 27 stanica tipa iMETOS. Cilj ove aktivnosti je bio da se uspostavi osnovna mjerna mreža na terenu kako bi se obezbjedili podaci o vremenskim prametrima i stepenu rizika od biljnih bolesti i štetočina u najvažnijim poljoprivrednim rejonima i na najdominantnijim poljoprivrednim kulturama.

Sa uspostavljanjem ove mreže, prirodno se nametnulo pitanje uvezivanja instaliranih stanica sa stanicama koje su već postojale na terenu u jedinstven sistem. Ovo se pose bno odnosilo na stanice u vlasništvu Republičkog Hidrometeorološkog zavoda koji je na terenu posjedovao oko 30 mjernih stanica. Problem je bio što su druge stanice bile drugog tipa tj. od drugog proizvođača pa je trebalo osmisliti način za njihovo jednostavno uvezivanje kao i za dodavanje novih stanica u sistem.

U periodu od 2016-2018. zahvaljući nastavku saradnje sa UNDP BIH, krenulo se u novu fazu projekta koji se odnosio na izradu posebne softverske platforme pod nazivom CARPO. Partneri u realizaciji projekta bile su tri organizacije: 1) Resor za pružanje stručnih usluga u poljoprivredi, 2) Republički Hidrometeorološki zavod i 3) Protivgradna preventiva Republike Srpske. Izrada sistema povjerena je grčkoj kompaniji Draxis Environmental iz Soluna, a kordinator projekta je bio Resor za pružanje strulnih usluga u poljoprivredi. Prva operativna verzija sistema CARPO puštena je u rad u junu 2018. godine.

The first activities of the Ministry of Agriculture, Forestry and Water Management of Republic of Srpska related to forecasting and reporting work began in 2014. with installation of automatic agrometeorological station in agricultural fields on Republic of Srpska teritory.

The project is implemented thanks to the support of UNDP BiH. In the period 201- 2016, 27 iMETOS type stations have been installed. The aim of this activity was to establish a basic measurement network in order to provide weather data and information about plant diseases and pests risk n the most important agricultural areas and the most dominant agricultural crops.

With the establishment of this network, the question of importing the already existing stations with the stations installed, naturally arose. This was especially reffered to stations owned by the Republic Hydrometeorological Institute, which had about 30 measurin way to import them and make system also available for adding new stations to the system in future as well.

From 2016 to 2018. thanks to the continued cooperation with UNDP BIH, a new phase of the project started, which referred to the development of a special software platform called CARPO. The partners in the realization of the project were three organizations: 1) Republic Agricultural Advisory Service, 2) the Republic Hydrometeorological Institute and 3) the Anti-hail Prevention of the Republic of Srpska. The development of the system was entrusted to the Greek company Draxis Environmental from Thessaloniki, and the project coordinator was Republic Agricultural Advisory Service. The first operational version of the CARPO system was launched in June 2018.

CARPO platfoma sastoji se iz 5 osnovnih funkcionalnih modula:

1. **Uvezivanje različitih tipova stanica u jedinstven sistem.** CARPO za sada omogućava uvezivanje 4 tipa stanica: iMetos, Davis, OTT i Vaisala. Podaci se pohranjuju u jedinstvenu bazu u vlasnišvu Ministarstva, odakle se povlače na web aplikaciju gdje su javno dostupni. Mjerenja za sve tipove stanica su dostupna u minimalnoj vremenskoj rezoluciji od 1 časa.

2. **Integrisanje vremenske prognoze.** Osim izmjerenih podataka, sistem 4 puta u toku dana preuzima vremensku prognozu za predstojećih 7 dana. Sistem koristi NOAA GFS (Global Forecasting System) prognozni model u rezoluciji od 25 km. Podaci su vezani za lokaciju svake pojedinačne stanice. Povlačenjem podataka za period od 7 dana unaprijed i njihovim spajanjem sa izmjerenim podacima formiran je kontinuiran niz podataka koji je korišten za izradu simulacija biljnih bolesti i štetočina.

3. **Simulacije rizika od bolesti i štetočina na poljoprivrednim kulturama.** Jedan od osnovnih motiva izrade CARPO sistema bio je da se napravi sistem koji će osim detektovanog rizika na osnovu izmjerenih podatka tj. informacije o onome „šta je bilo?", ponudi informaciju o očekivanom riziku nekoliko dana unaprijed, tj. „šta će biti?", na osnovu prognoziranih podataka. Pri tome, za simulaciju vlažnosti lista u budućem vremenu korišten je CART/SLD/Wind (Gleason et al., 1994) model, koji status vlažnosti izračunava na osnovu padavina, temperature, relativne vlažnosti, brzine vjetra i depresije tačke rosišta.

The CARPO platform consists of 5 basic functional modules:

Importing different station types into a single system. CARPO currently allows the import of 4 types of stations: iMetos, Davis, OTT and Vaisala. The data is stored in a single database owned by Ministry, from where it is retrieved to a web application where it is publicly available. Measurements for all station types are available in a minimal time resolution of 1 hour.

2. **Integration of weather forecast.** In addition to the measured data, the system downloads weather forecast for the next 7 days 4 times per day. The system uses the NOAA GFS (Global Forecasting System) forecast model with a resolution of 25 km. The data is related to the location of each individual station. By taking the data for a period of 7 up-coming days and combining them with the measured data, a continuous series of data was formed which was used to create plant pest and diseases simulations.

3. **Simulation of risk from diseases and pests on agricultural crops.** One of the basic motives for creating a CARPO system was to create a system that, in addition to the detected risk based on measured data, ie information about "what happened? „, provide information about the expected risk a few days in advance, ie" what will happen? ", based on forecast data. The CART / SLD / Wind (Gleason et al., 1994) model was used to simulate missing leaf moisture parameter in the future, which calculates the humidity status based on precipitation, temperature, relative humidity, wind speed and dew point depression

Za sada CARPO sistem sadrži 5 modela za bolesti i štetočine:

1. Apple and pear scab (Venturia inaequalis, V.pyrina) – Mils revised model (MacHardy W., Gedoury D., 1989.);
2. Grey mold on Raspberry, Blackberry, Strawberry and Grape (Botrytis cinerea) – model by Broom-u (Broome, J. C., English, J. T. Marois, J. J., Latorre, B. A. and Aviles, J. C. 1995.);
3. Apple and Pear Fire Blight (Erwinia amylovora) – Cougarblight model (Smith, T.J., 2010);
4. Codling Moth (Carpocapsa pomonella) – degree-day sum model (Pitcairn, M. J., F. G. Zalom, and R. E. Rice. 1992.),
5. Potato and Tomato Late Blight (Phytophtora infestans) – IPI+MISP model (Bugiani, R., Cavanni, P. and Ponti, I. 1993;). The model results otput is available in form of a table and graph.

4. Razvoj korisničkog okruženja. Osim osnovnih podataka koji se odnose na svaku stanicu, korisnik je u mogućnosti da izradi vlastiti profil. Korisničko okruženje daje mogućnost registracije parcela i evidencije tretiranja. Takođe, korisniku je omogućeno da unosi podatke koji su značajni za funkcionisanje modela kao što su početak vegetacije, fenofaze gajene kulture, prisustvo patogena ili štetočine u prethodnoj sezoni i sl. U tom slučaju model koristi date podatke i daje precizniji ispis koji se odnosi samo na evidentiranu parcelu. Funkcionisanje ovog modela svoju punu primjenu treba da pronađe sa implementacijom kompleksnijih modela, koji zahtjevaju više inputa od strane korisnika.

5. Razvoj mobilne aplikacije. Mobilna aplikacija CARPO dostupna je na eStoreu i Google Play Storeu. Korisniku je ponuđen uprošćen prikaz ispisa modela. Putem mobilne aplikacije, korisnik dobija stručne preporuke pisane od strane savjetodavaca Resora za pružanje stručnih usluga u poljoprivredi. Takođe, korisnici putem aplikacije mogu da uslikaju evidentirani problem na parceli, uslikaju ga i proslijede savjetodavcima.

For now, the CARPO system contains 5 models for diseases and pests:

1. Apple and pear scab (Venturia inaequalis, V.pyrina) – Mils revised model (MacHardy W., Gedoury D., 1989.);
2. Grey mold on Raspberry, Blackberry, Strawberry and Grape (Botrytis cinerea) – model by Broom-u (Broome, J. C., English, J. T. Marois, J. J., Latorre, B. A. and Aviles, J. C. 1995.);
3. Apple and Pear Fire Blight (Erwinia amylovora) – Cougarblight model (Smith, T.J., 2010);
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5. Potato and Tomato Late Blight (Phytophtora infestans) – IPI+MISP model (Bugiani, R., Cavanni, P. and Ponti, I. 1993;). The model results otput is available in form of a table and graph.

4. User environment development. In addition to the basic data relating to each station, the user is able to create their own profile. The user environment provides the possibility of plot registration and treatment records. Also, the user is allowed to enter data that are important for the functioning of the model such as the beginning of vegetation, phonological stadium of cultivated culture, the presence of pathogens or pests in the previous season, etc. In this case the model uses provided data and gives a more accurate result related to recorded parcel. The functioning of this model should find its full application with the implementation of more complex models, which require more user inputs.

5. Mobile application development. CARPO mobile app is available on the eStore and Google Play Store. App provide simplified view of the model outputs. Through the mobile application, the user receives expert recommendations written by the advisors of the Republic Agricultural Advisory Service. Also, users through the application can take a picture of the recorded problem on the plot, take a picture of it and forward it to the advisors.

Aktivnosti u 2020.

Osnovna ideja iza projekta CARPO temelji se na razvoju domaćih stručnih kapaciteta sa ciljem pomoći poljoprivrednim proizvođačima. Razvojem CARPO platforme, stvoreni su solidni uslovi za konkretnije bavljenje poljoprivrednih stručnjaka, meteorologa, studenata i drugih aktivnosima na polju poljoprivredne prognoze, biološkim simulacijama, prognozom rizika i sl.
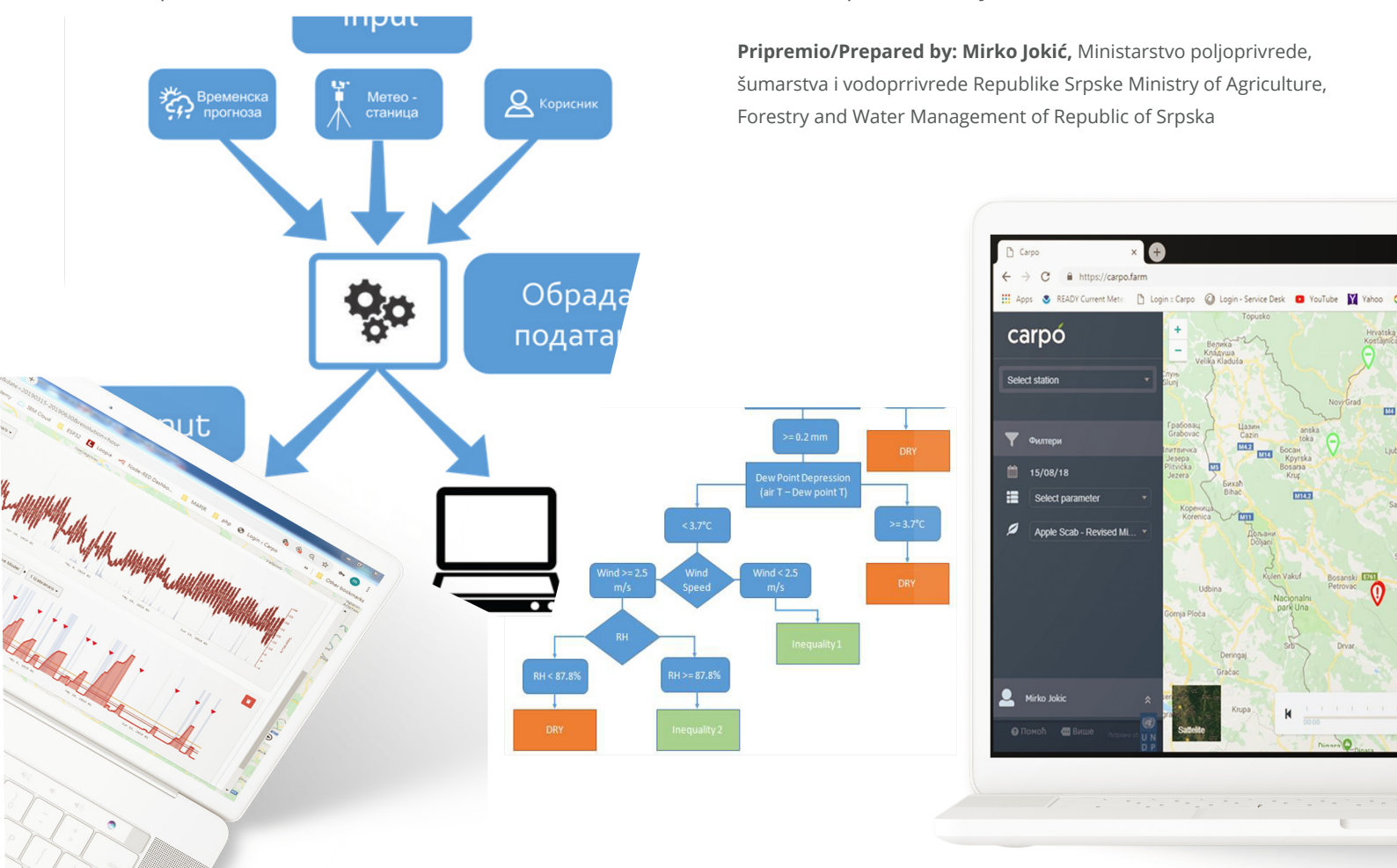
U toku 2019. i 2020. kroz saradnju sa poljoprivrednim fakultetom u Banjoj Luci, izvršena je evaluacija jednog modela (model za sivu trulež maline) u sklopu master rada autora Mišaele Vakić (Prognoza sive truleži maline (Botrytis cinerea Pers.) na malini u 2018. i ocjena efikasnosti primjene fungicida). U toku 2020. Publikovano je 40 preporuka za 5 najzastupljenijih biljnih kultura, koje su bile dostupne na mobilnoj aplikaciji. Nastavak rada na razvoju CARPO sistema zahtjeva šire uključenje studenata i savjetodavaca, zatim njihovu edukaciju u korištenju programskih jezika kao i rad na edukaciji poljoprivredih proizvođača u podizanju njihove informatičke pismenosti.

Activities in 2020

The basic idea behind the CARPO is based on professional capacities development engaged in order to help farmers. With the development of the CARPO platform, solid conditions have been created for more concrete engagement of agricultural experts, meteorologists, students and others in fields as are agricultural forecasting, biological simulations, risk assessment etc.

During 2019. and 2020, through cooperation with the Faculty of Agriculture in Banja Luka, one model was evaluated as part of the master's thesis by Mišaela Vakić (Forecast of gray rot of raspberries (Botrytis cinerea Pers.) on raspberries in 2018. and evaluation of the effectiveness of fungicides). During 2020, in total 40 recommendations for the 5 most common crops were published, which were available on the mobile application. Continuation of work on the development of the CARPO system requires wider involvement of students and advisors, followed by their education in the use of programming languages as well as work on the education of agricultural producers in raising their computer literacy.

Pripremio/Prepared by: Mirko Jokić, Ministarstvo poljoprivrede, šumarstva i vodoprrivrede Republike Srpske Ministry of Agriculture, Forestry and Water Management of Republic of Srpska

U susret novom znanju o upotrebi IKT u poljoprivredi – Uvodna radionica

Radni paket 2 – Unapređenje komeptencija u upotrebi IKT u poljoprivredi

Prepoznajući potrebu da se nastavno osoblje u sektoru poljoprivrede i elektrotehnike upozna sa novitetima u primjeni informaciono - komunikacionih tehnologija u poljoprivredi, održana je uvodna radionica na ovu temu. Jačanje kapaciteta nastavnog osoblja jedan je od najvažnijih ciljeva Erasmus + VIRAL projekta. Zbog zdravstvene sigurnosti (radi pandemije uzrokovane virusom COVID 19), prva uvodna radionica u nizu treninga o primjeni informaciono - komunikacionih tehnologija u poljoprivredi u okviru projekta VIRAL, organizovana je 16. septembra 2020. u periodu od 15:30 do 18:30 časova.

Radionica je bila namijenjena prvenstveno nastavnom osoblju i studentima master i doktorskih studija visokoškolskih ustanova u Bosni i Hercegovini i Crnoj Gori, ali i ostalim zainteresiranim pojedincima, prije svega učesnicima VIRAL projekta i predstavnicima agrobiznis sektora. Imajući u vidu specifičnosti same organizacije, formalni domaćin sastanka bio je Univerzitet u Banjoj Luci.

Aktivnost je provedena u okviru radnog paketa 2 (WP2.1) čiji su koordinatori Univerzitet DonjaGorica i Univerzitet Wageningen.

Samoj radionici je u manjoj ili većoj mjeri prisustvovalo 77 učesnika. Učesnici su bili iz partnerskih institucija projektnih konzorcijuma, ali i iz drugih institucija izvan projektnog konzorcijuma. Najveći broj učesnika bio je iz Bosne i Hercegovine i Crne Gore, gotovo podjednako zastupljeni po polu uz saglasnost svih učesnika da se materijali sa skupa mogu koristiti za dalju distribuciju i popularizaciju ove teme.

Towards new knowledge on the use of ICT in agriculture - Introductory workshop

Work package 2.1 Improved competences of the use of ICT in agriculture)

Recognizing the need for the teaching staff in the sector of agriculture and electrical engineering to get acquainted with the novelties in the application of information and communication technologies in the field of agriculture, an introductory workshop on this topic was held. Strengthening the capacity of teaching staff is one of the most important goals of the Erasmus + VIRAL project. Due to health security (pandemic caused by COVID 19 virus), the first introductory workshop in a series of trainings on the application of information and communication technologies in agriculture within the VIRAL project, was organized on September 16th, 2020 in the period from 3.30 to 6.30 PM.

The workshop was intended primarily for teaching staff and students in master and doctoral studies of higher education institutions in Bosnia and Herzegovina and Montenegro, but also for other interested individuals, primarily participants in the VIRAL project and representatives of the agribusiness sector. Having in mind the specifics of the organization itself, the formal host of the meeting was the University of Banja Luka.

The activity was implemented within the work package 2 (WP2.1) whose coordinators are the University of DonjaGorica and the University of Wageningen.

The workshop itself was attended by 77 participants to a greater or lesser extent. Participants were from project consortium partner institutions, but also from other institutions out of project consortium. The largest number of participants were from Bosnia and Herzegovina and Montenegro, almost equally represented by gender with the consent of all participants that the materials from the meeting can be used for further distribution and popularization of this topic.

Najznačajniji rezultati radionice su sljedeći:

- radionica je omogućila učesnicima da se od najpoznatijih predavača upoznaju sa najnovijim dostignućima na polju IKT-a;
- radionica je pružila prvo službeno predstavljanje i kontakt sa većinom kolega iz Wageningena, šire akademske zajednice u BiH i Crnoj Gori, kao i Rumunije, Slovenije i Srbije;
- uvodna radionica stvorila je preduslove za nastavak ostalih obuka i time uspješan nastavak radnog paketa 2;
- uspostavljen kontakt za sve zainteresovane za dalju saradnju i razvoj novih ideja i zajedničkih aktivnosti;
- učesnici radionice dobijaju potvrdu o pohađanju radionice, što će za mlađe kolege, posebno studente, možda biti važno u njihovom daljem napretku.

Za sve zainteresovane koji nisu mogli prisustvovati radionici, odgovarajući materijali dostupni su na web stranici projekta:

a. Cijela prezentacija i snimljeni prateći materijal radionice https://www.youtube.com/watch?v=muizyEVFj1o
b. Bedir Tekinerdogan prezentacija i snimljeni prateći materijal radionice https://www.youtube.com/watch?v=iqpQUevFgxE
c. Cagatay Catal prezentacija i snimljeni prateći materijal radionice https://www.youtube.com/watch?v=8no-Q4rQ4k0
d. Qingzhi Liu prezentacija i snimljeni prateći materijal radionice https://www.youtube.com/watch?v=DDsvknr_YI0
e. João Valente prezentacija i snimljeni prateći materijal radionice https://www.youtube.com/watch?v=r1ypy7vfHJI

The most significant results of the workshop are the following:

- the workshop enabled the participants to get acquainted with the latest achievements in the field of ICT from renowned lecturers;
- the workshop provided the first official introduction and contact with most colleagues from Wageningen, the wider academic community in BiH and Montenegro, as well as Romania, Slovenia and Serbia;
- the introductory workshop created the preconditions for the continuation of other trainings and thus the successful continuation of the work package 2;
- established contact for all interested in further cooperation and development of new ideas and joint activities;
- workshop participants will receive a certificate of attendance at the workshop, which for younger colleagues, especially students, may be important in their further progress.

For all interested, who were not able to attend the workshop, the appropriate materials are available on the project website:

a. The whole workshop presentation and recording https://www.youtube.com/watch?v=muizyEVFj1o
b. Bedir Tekinerdogan presentation and recording https://www.youtube.com/watch?v=iqpQUevFgxE
c. Cagatay Catal presentation and recording https://www.youtube.com/watch?v=8no-Q4rQ4k0
d. Qingzhi Liu presentation and recording https://www.youtube.com/watch?v=DDsvknr_YI0
e. João Valente presentation and recording https://www.youtube.com/watch?v=r1ypy7vfHJI

**Pripremili/Prepared by:
Bedir Tekinerdogan, WUR
Miljan Cvetkovic, UNIBL**

IOT i GIS u poljoprivredi

IoT and GIS in Agriculture

Radni paket 2.1. Jačanje kompetencija o korištenju IKT u poljoprivredi (trening I)

Work package 2.1. Improved competences of use of ICT in agriculture (training I)

Uvažavajući potrebu da se nastavno osoblje u sektoru poljoprivrede i elektrotehnike upozna sa novostima u primjeni informaciono komunikacionih tehnologija u oblasti poljoprivrede, Univerzitet u Tuzli, Fakultete elektrotehnike , je 29. i 30. Septembra 2020. godine u okviru projekta Viral, organizovao radionicu pod nazivom: "IOT i GIS u poljoprivredi".

Zbog zdravstvene bezbjednosti (pandemija uzrokovana COVID-19 virusom) radionica je organizovana online (Zoom platforma) i uživo. Drugi dan radionice učesnici su posjetili firmu Plant. d.o.o.

Na konferenciju su predstavljene sledeće teme:
1. **"Location Intelligence and Trends in Geographic Information Systems: Use Cases from Bosnia and Herzegovina"** - Almir Karabegović, Univerzitet u Sarajevu, Fakultet elektrotehnike, GAUSS Centar za Geoprostorno istraživanje, Sarajevo
2. "**Application of GIS in Agriculture"** – Milan Šipka, Univerzitet u Banja Luci, Poljoprivredni fakultet
3. **"Applications of Digital Signal Processing in Agriculture "-** Zdenka Babić, Univerzitet u Banja Luci, Fakultet elektrotehnike
4. "**Smart Farming: A Case of Automatic Cow Milking System"** - Asmir Gogić, Univerzitet u Tuzli, Fakultet elektrotehnike
5. **"Incorporating smart IoT agriculture systems into engineering curriculum"** - Alma Šećerbegović, Univerzitet u Tuzli, Fakultet elektrotehnike
6. **"Remote Monitoring and Control System for Greenhouse Based on IoT "-**Aljo Mujčić, Univerzitet u Tuzli, Fakultet elektrotehnike

Recognizing the need for the teaching staff in the sector of agriculture and electrical engineering to get acquainted with the novelties in the application of information and communication technologies in the field of agriculture, University of Tuzla, Faculty of Electrical engeneering, on September 29th -30th, within the VIRAL project, organized workshop entitled „ IoT and GIS in Agriculture „.

Due to health security (pandemic caused by COVID 19 virus) workshop was organized online and in-class. On the second day participants visited Plant d.o.o.

The following topics were presented at the conference:
1. **"Location Intelligence and Trends in Geographic Information Systems: Use Cases from Bosnia and Herzegovina"** - Almir Karabegović, University in Sarajevo,Faculty of Electrical Engineering, GAUSS Center for Geospatial Research Sarajevo
2. **"Application of GIS in Agriculture"** – Milan Šipka, University in Banja Luka, Faculty of Agriculture
3. **"Applications of Digital Signal Processing in Agriculture "-** Zdenka Babić, University in Banja Luka,Faculty of Electrical Engineering
4. "**Smart Farming: A Case of Automatic Cow Milking System"** - Asmir Gogić, University in Tuzla,Faculty of Electrical Engineering
5. **"Incorporating smart IoT agriculture systems into engineering curriculum"** - Alma Šećerbegović, University in Tuzla, Faculty of Electrical Engineering
6. **"Remote Monitoring and Control System for Greenhouse Based on IoT "-** Aljo Mujčić, Univerzitet u Tuzli, Fakultete elektrotehnik

The workshop was intended primarily for teaching staff and students in master and doctoral studies of higher education institutions in Bosnia and Herzegovina and Montenegro, but also for other interested individuals, primarily participants in the VIRAL project and representatives of the agribusiness sector.

The conference was attended by more than 45 participants (online and in-class), including representatives of the large companies active in the agricultural sector, teaching staff, students and

Radionica je bila namijenjena prvobitno nastavnom osoblju i studentimavisokoškolskih ustanova u Bosni i Hercegovini i Crnoj Gori, ali i drugim zainteresovanimpojedincima, prije svega učesnicima VIRAL projekta i predstavnicima biznis sektora.

Konferenciji je prisustvovalo više od 47 učesnika (uživo i online), među kojima je bilo predstavnika velikih kompanija aktivnih u sektoru poljoprivrede, nastavnog osoblja, studenata i predstavnika drugih institucija.

Pripremio/Prepared by:
Aljo Mujčić, UNTZ

Mobilne aplikacije, robotika i korištenje dronova u poljoprivredi – mogućnost i potreba

Radni paket 2.1. Jačanje kompetencija o korištenju IKT u poljoprivredi (trening II)

Radionica je bila namijenjena prvenstveno nastavnom osoblju partnerskih institucija iz BiH i Crne gore te studentima magistarskih i doktorskih studija, ostala je otvorena i ostalima bilo da su na projektu zainteresiranim ili predstavnici iz poljoprivrede i gospodarstva (priložena agenda). Predavači su bili profesori, istraživači, profesionalci te predstavnici vladinih institucija i agencija.

Radionica je otvorena pozdravnim govorima dekana fakulteta prof. dr. Ivana Ostojića te prorektorice sveučilišta prof. dr. Sanje Bijakšić.

Prvog dana predstavljeno je 6 tema važnih za IKT kako u edukaciji tako i u praksi u poljoprivredi i prehrambenoj industriji.

- **JURIJ RAKUN** Univerzitet u Mariboru
  Robotika u poljoprivredi (online prezentacija)
- **TOMO POPOVIĆ** Univerzitet Donja Gorica
  Precizna poljoprivreda bazirana na IoT i mobilnim aplikacijama (online prezentacija)
- **MILJAN ERBEZ** Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srpske
  OPTIMILK – racionalizacija obroka kod mliječnih krava
- **MLADEN ZOVKO** Sveučilište u Mostaru
  IT sustavi u integralnoj zaštiti povrća – koristan alat ili potreba?
- **FARIS SEFARAGIĆ** META5 d.o.o. Mostar
  Putovanje od poljoprivrede do IT kompanije
- **JOÃO VALENTE** Wageningen Sveučilište i istraživački centar
  Praktična upotreba dronova u poljoprivredi (online presentation)
- **NIKOLA JOVANOVIĆ** BHDCA
  Regulativa o upotrebi dronova u BiH

Mobile applications, robotics and the use of drones in agriculture - possibility and need

Work package 2.1. Improved competences of use of ICT in agriculture (training II)

The workshop was intended primarily for teaching staff and students in master and doctoral studies of higher education institutions in Bosnia and Herzegovina and Montenegro, but also for other interested individuals, primarily participants in the VIRAL project and representatives of the agribusiness sector. Workshop agenda is added to the report. The lecturers were professors, researchers, professionals and administrative staff.

Training was open with greetings from Faculty (dean Ivo Ostojić, professor) and University management (vice rector professor Sanja Bijakšić).

Through the first day of a workshop, 6 topics of importance for ICT in the field of education and practical application in agriculture and food industry were presented.

- **JURIJ RAKUN** University of Maribor
  Robotics in Agriculture (online presentation)
- **TOMO POPOVIĆ** Univeristy Donja Gorica
  Precision Agriculture based on IoT, Cloud, and Mobile Apps
- **MILJAN ERBEZ** Ministry of Agriculture, Forestry and Water Management of Republic of Srpska
  OPTIMILK – meal rationing application for dairy cows
- **MLADEN ZOVKO** University of Mostar
  IT systems in Integrated Plant Production – useful tool or need?
- **FARIS SEFARAGIĆ** META5 d.o.o. Mostar
  Journey from Agriculture to IT company
- **JOÃO VALENTE** Wageningen University & Research
  Practical use of drones in Agriculture (online presentation)
- **NIKOLA JOVANOVIĆ** The Bosnia and Herzegovina Directorate of Civil Aviation
  Regulation of drones use in B&H

Prezentacije su obuhvaćale izlaganje te set pitanja i odgovora na kraju svake sesije, a obuhvaćena su i pitanja pristigla na Zoomu. Iz popisa predavača vidljiva je raznolikost od akademije, preko struke do državne administracije. Time su obuhvaćene sve ciljane grupe.

Svi su predavači pokazali zaintersiranost za dalju suradnju s prijektom kroz komunikaciju, diseminaciju i druge aktivnosti. Poseban interes sudionika priuklo je predavanje predstavnika mlade kompanije Meta 5, o njihovom putu od prijave na hackaton do pokretanja kompanije što otvara mogućnost buduće suradnje s projektom.

Drugi dan je bio rezerviran za posjet kompanijama iz područja poljoprivrede. Posjetili smo "Jaffa Komerc" koja je jedan od partnera na projektu.

Za više informacija:
http://viralerasmus.org/#
http://viralerasmus.org/ict-u-poljoprivredi/

Dodati
Pripremila/Prepared by:
Ana Mandić, SUM

The lecturers were done by presentation at the location or on line, and time for questions and answers at the end of sessions. Q and A was possible to all attendee thanks to the Zoom platform.

All lecturers expressed interest in further cooperation with project through additional communication, distribution of their work or other activities. Special interest was in presentation done by young start up company Meta 5 due to their interested story on hackathon start and possible future connection with project on this subject. Lecturers were not only from academia but also from administration (ministry and state agency) so all targeted groups were addressed.

Second day was reserved for field visit. We have visited company "Jaffa Komerc", one of the project partners from business.

For more information:
http://viralerasmus.org/en/home/
http://viralerasmus.org/en/ict-in-agrictulture/

Praktični vodič za upotrebu informaciono-komunikacionih tehnologija (IKT) u obrazovanju i obukama u poljoprivredi (AET)

Radni paket 2 (2.6) – Izgradnja kompetencija u obrazovanju i obukama u poljoprivredi
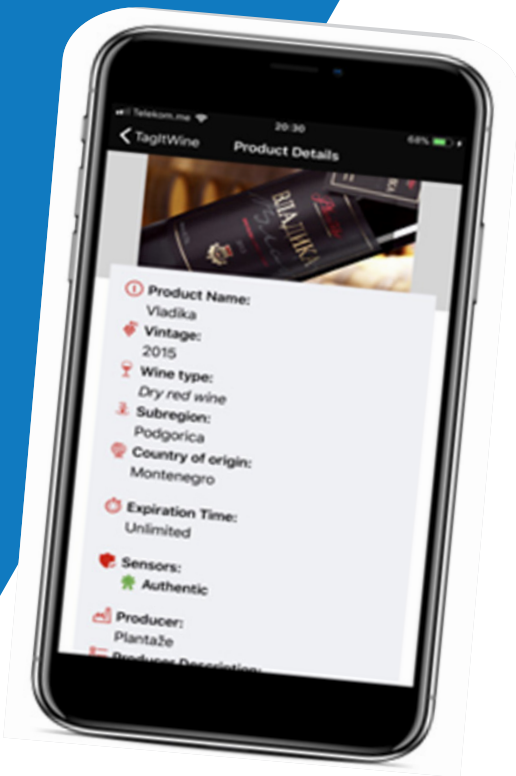
Practical Guide for the Use of Information and Communication Technology (ICT) in Agricultural Educational and Training (AET)

Work package 2 (2.6) - Building Competences in Agricultural Education and Training (AET)

Praktični vodič za upotrebu informaciono-komunikacionih tehnologija (IKT) u poljoprivredi i obuke u poljoprivrednom obrazovanju (AET) analizira upotrebu robotike, dronova, mobilnih aplikacija i GIS-a u poljoprivredi i daje praktične ilustracije njihovih primjena. Ovaj vodič namenjen je profesionalcima koji se bave poljoprivrednim biznisima (farme, zadruge, kompanije itd.) i predstavljaće popularni priručnik primjera najčešćih i široko dostupnih primjena IKT u poljoprivredi i njihovih benefita.

Practical guide for the use of information and communication technology (ICT) in agriculture and agriculture educational training (AET) addresses the use of robotics, drones, mobile applications, and GIS with practical illustrations of applications and their benefits. This guide is intended to professionals engaged in agri-business (farms, cooperatives, companies, etc.) and will represent popular handbook with examples of most common and wide available application of ICT in agriculture and benefits received from its application.

Vodič ima pet poglavlja:
 I Opšta upotreba IKT u poljoprivredi - Uvod;
 II Upotreba robotike u poljoprivredi;
III Upotreba dronova u poljoprivredi;
IV Korišćenje mobilnih aplikacija u poljoprivredi;
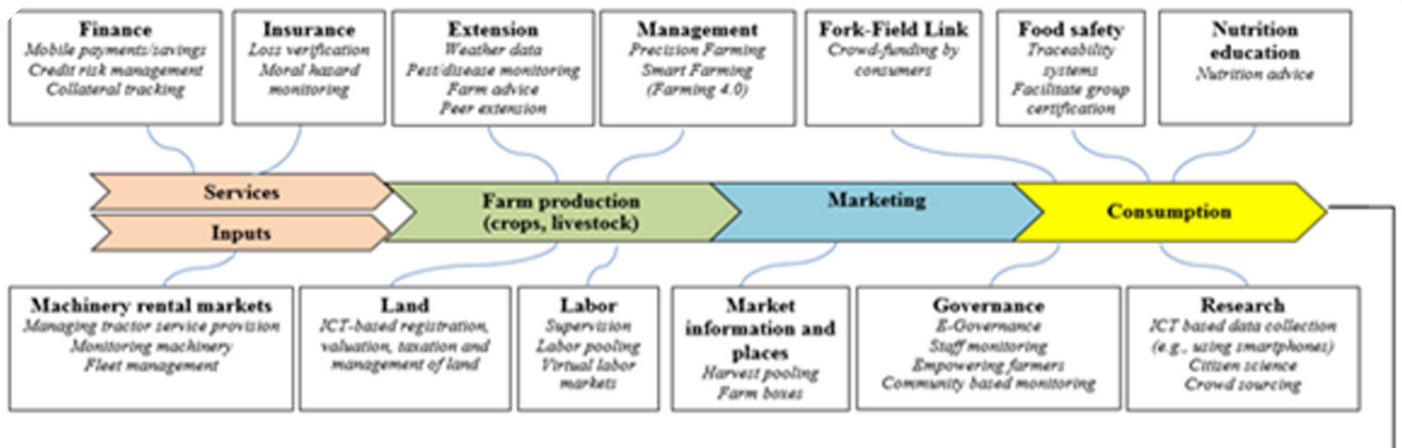 V Upotreba GIS-a u poljoprivredi.

 U prvom poglavlju dat je pregled razvoja informaciono-komunikacionih tehnologija u poljoprivredi, takođe poznatih kao e-poljoprivreda ili pametna poljoprivreda.
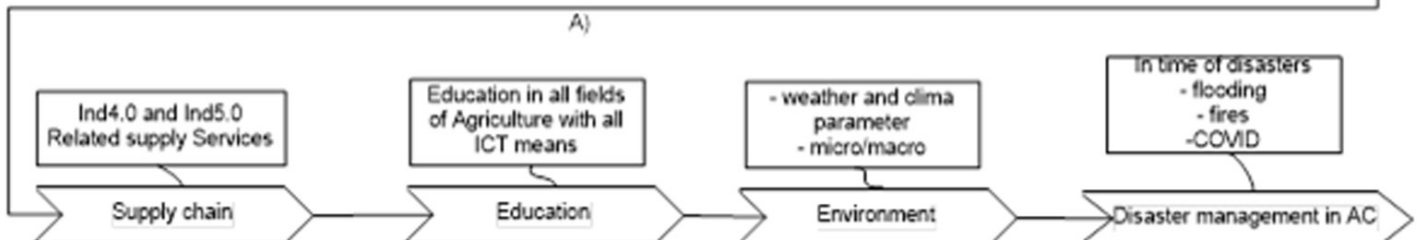
Guide has five chapters:

I General use of ICT in agriculture – Introduction;
II   Use of robotics in agriculture;
III   Use of drones in agriculture;
IV   Use of mobile applications in agriculture;
V   Use of GIS in agriculture.

In first chapter is given overwiev of develpomnet of information and communication technology in agriculture (ICT in agriculture), also known as e-agriculture or smart-agriculture. This area of science focuses on the use of different ICT technologies, products and services in order to foster and improve agriculture. ICT can be applied along the entire agricultural value chain. They can be used to better manage the basic factors of production (land, labour, capital and also soil), to access inputs and services, including extension services, and to facilitate processing and marketing. They can also be applied at the level of the consumers.
In new content the ICT in agriculture is applied in advanced areas as Supply Chain, Industry 4.0, Industry 5.0 services, Education, Research and related fields as showed in Figure 1. Especially in education and research Internet becomes very powerful tool. There is very intensive application of ICT in monitoring environmental conditions in agriculture (weather parameters, micro and macro clime, climate changes etc).

Ova oblast nauke fokusira se na upotrebu različitih IKT tehnologija, proizvoda i usluga u cilju podsticanja i unapređenja poljoprivrede. IKT se mogu primjeniti u čitavom lancu vrednosti poljoprivrede.

Mogu se koristiti za bolje upravljanje osnovnim faktorima proizvodnje (zemlja, rad, kapital i zemljište), za pristup inputima i uslugama, uključujući i savjetodavne usluge, kao i za olakšavanje obrade podataa i marketinga. Takođe se mogu primeniti na nivou analize ponašanja i preferenci potrošača.

U novijim aktivnostima, IKT u poljoprivredi se primjenjuje u naprednim oblastima kao što su: Lanac snabdevanja, Industrija 4.0, Usluge Industrije 5.0, Obrazovanje, Istraživanje i srodna polja kao što je prikazano na slici 1. Internet naročito postaje izuzetno moćno sredstvo u obrazovanju i istraživanju. Postoji vrlo intenzivna primjena IKTa u praćenju uslova životne sredine u poljoprivredi (vremenski parametri, mikro i makro klima, klimatske promene itd.)

Drugo poglavlje istražuje različite vrste upotrebe robota u poljoprivredi. S jedne strane su predstavljeni roboti napravljeni za rad u zatvorenom okruženju, kao što su roboti za rad u stakleniku, a sa druge strane je predstavljen status robota koji bi trebalo da rade na polju, podjeljenih na osnovu njihove veličine, namjene, podržavajući senzorne sisteme i tehnologije na kojoj se zasnivaju; zatim riješenja za motore sa unutrašnjim sagorevanjem (ICE), električne i hibridne.

Treće poglavlje posvećeno je upotrebi bespilotnih letjelica/dronova u preciznoj poljoprivredi i sintetizovalo je zapažanja i sugestije iz različitih studija. Istražena je upotreba dronova u preciznoj poljoprivredi, diskutovano je o oblastima primjene i tipu uređaja i predstvljene su mogućnosti, izazovi i budući pravci istraživanja. Takođe, predstavljena je i laboratorija za dronove kao i istraživački projekti koji se trenutno sprovode. Primjećeno je da je ova vrsta laboratorije

Second chapter investigate different kinds of use of robots in agriculture. On one hand are presented the robots built to work in an indoor environment, such as greenhouse robots, and on second handed presented are status of the robots that should work outside, like field robots, divide based on their size, purpose, supporting sensory systems and technology they are based on; internal combustion engine (ICE) powered, electrical and hybrid solutions.

Third chapter is dedicated to the use of UAVs/drones in precision farming and synthesized the observations and suggestions discussed in these studies. We have investigated the use of UAVs/drones in precision agriculture, discussed the application areas and the type of devices, and presented the opportunities, challenges, and future research directions. Also, we presented our drone lab and discussed some of the research projects that are currently being implemented. We observed that this type of drone labs are quite useful for educational and research activities and improve the research collaborations

Fourth chapter focuses on the use of mobile applications in smart agriculture and megatrends in ICT (internet of things, cloud, big data and data analytics, social media) that enable implementation of such solutions as well their as practical application in Montenegro.

Production of food in a cost-effective manner is the essential goal of every farmer, large-scale farm manager and regional agricultural agency so fifth chapter describes use of GIS and Remote sensing (RS). These technologies are used to analyse and visualize agricultural environments has proved to be very beneficial to farming community as well as industry. It plays great role in agriculture throughout the world by helping farmers in increasing production, reducing costs and managing their land more efficiently.

The fast spread of ICT devices has led to a strong interest by public and private sectors to develop ICT applications for farmers and

Četvrto poglavlje fokusira se na upotrebu mobilnih aplikacija u pametnoj poljoprivredi i megatrendove u IKT-u (internet of things, cloud, big data and analitika podataka, društvene mreže) koji omogućavaju implementaciju takvih rješenja, ali i njihovu praktičnu primjenu u Crnoj Gori.

Proizvodnja hrane na isplativ način je osnovni cilj svakog poljoprivrednika, menadžera velikih farmi i regionalne poljoprivredne agencije, s toga se peto poglavlje bavi upotrebom GIS-a i daljinskog istraživanja (RS). Ove tehnologije se koriste za analizu i vizualizaciju poljoprivrednog okruženja o pokazale su se veoma korisnim za poljoprivrednu zajednicu, kao i za industriju. Igraju veliku ulogu u poljoprivredi širom svijeta pomažući poljoprivrednicima u povećanju proizvodnje, smanjenju troškova i efikasnijem upravljanju njihovom zemljom.

Brzo širenje IKT dovelo je do snažnog interesa javnog i privatnog sektora za razvoj IKT aplikacija za poljoprivrednike i zajednicu u cilju boljeg pristupa inputima, uslugama i tržištima kao i za podršku upravljanju farmama i donošenju odluka. Konačno, upotreba IKT je neizbježna u lancu snabdevanja poljoprivrednim proizvodima, kao i u obrazovanju i marketingu. Ova studija ne samo da otvara put za dalja istraživanja u preciznoj poljoprivredi, već takođe predstavlja nove ideje o primeni koje mogu da primene stručnjaci u budućnosti.

Za više informacija:
http://viralerasmus.org/#

Pripremila/Prepared by:
Jovana Drobnjak, UDG

community to access inputs, services and markets and to support farm management and decision-making. Finally, the usage of ICT is unavoidable in supply chain of agro products as well in education and marketing.

This study not only paves the way for further research in precision farming but also presents novel application ideas that can be applied by practitioners in the future.

For more information: http://viralerasmus.org/en/home/

TagItSmart senzori za prevenciju falsifikata u vinskoj industriji

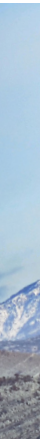*TagItSmart sensors for preventing wine industry frauds*

Kompanija "13. jul Plantaže", kao najveći proizvođač vina u Crnoj Gori i regionu, prepoznala je značaj naučnih istraživanja za razvoj inovacija i kompetentnosti i predstavlja pozitivan primjer povezivanja nauke i privrede. Kompanija je licencirana za naučno-istraživački rad u oblasti poljoprivrede i do sada je implementirano i aktivno više naučnih projekata iz oblasti vinogradarstva, vinarstva i voćarstva.
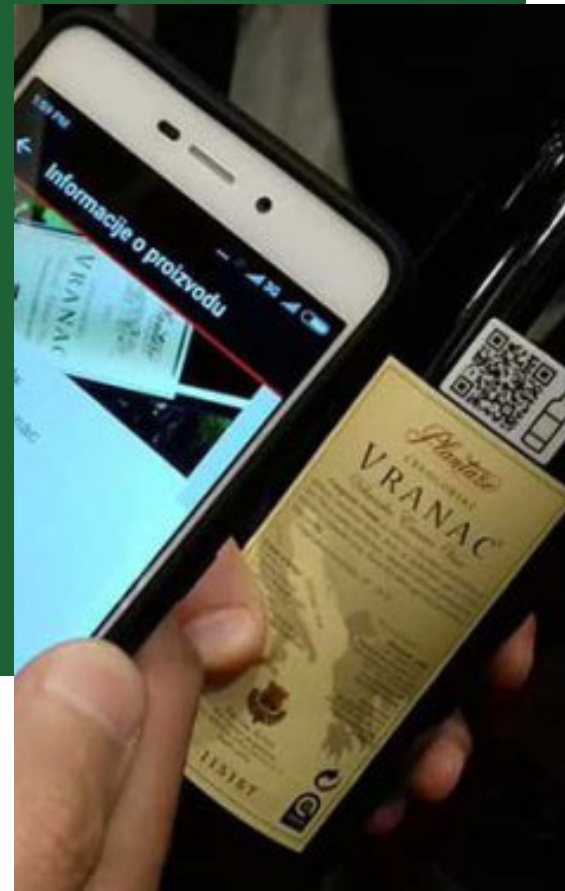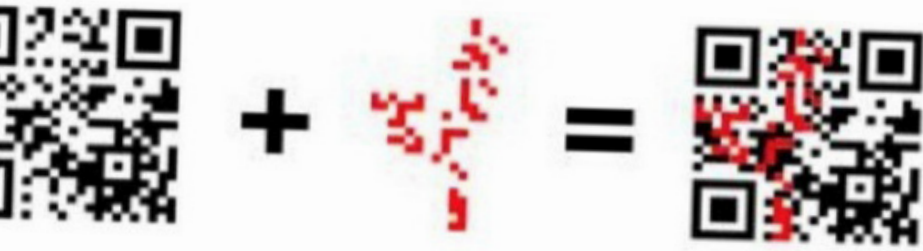
Kako moderno vinogradarstvo i vinarstvo prati sve veće korišćenje novih tehnologija (ICT), naše aktivnosti su takođe direktno usmjerene ka primjeni ICT tehnologija u vinogradarstvu i proizvodnji vina. Jedan od uspješno realizovanih projekata bio je **Pilot projekat Zaštite Brenda i Sprečavanje Falsifikovanja u Vinskoj Industriji (TagItWine), koji je podržan putem "TagItSmart"** projekta u okviru "Horizont 2020" Programa za Istraživanje i Inovacije, od strane Evropske Komisije.

Cilj ovog pilot projekta bio je korišćenje TagItSmart (TIS) platforme za primjenu i izvođenje potpuno funkcionalnog pilota za zaštitu brenda i borbu protiv falsifikovanja u vinskoj industriji. Pilot projekat je koristio različite TIS komponente podržane od strane Smart tag- a, baziranih na QR kodovima koji mogu biti korišćeni na vinskim flašama tokom njihovog upotrebnog ciklusa. Pilot projekat zaštite brenda uključio je neke funkcionalnosti iz primjera TIS- ovog digitalnog

The company "13. jul Plantaže" as the biggest wine producer in Montenegro and region as well, also recognized the importance of scientific research for the development of innovation and competitiveness, and represents a positive example of connection between science and economy. The company is licensed for the scientific and research work in the field of agriculture and a series of scientific projects in the field of viticulture, winemaking and fruit growing have been implemented and are performing at the moment.

As modern viticulture and winemaking are followed by increased use of new information and communication (ICT) technologies, our activities are also directed towards the application of ICT technologies in viticulture and wine production. One of successful implemented projects was the **Pilot for Brand Protection and Anti-Counterfeiting in Wine Industry (TagItWine)**, which has been supported through the project titled "Smart Tags driven service platform for enabling ecosystems of connected objects" - TagItSmart! under the "Horizont 2020 – the Framework Programme for Research and Innovation (2014-2020)" of the European Commission.

proizvoda i upravljanjem upotrebnim cikusom istih. Tokom perioda implementacije projekta, Smarttag-ovi su napravljeni od strane TagItSmart partnera DURST i VTT, a TagItWine tim usko je sarađivao takođe sa DunavNet-om, DURST-om i g-dinom Rob van Kranenburg-om.

Razvijena je aplikacija dostupna za Android i iOS uređaje, gdje se skeniranjem QR koda sa specijalnim slovima putem mobilnog telefona dobijaju podaci o autentičnosti, vrsti vina, berbi i proizvođaču, kao i preporuke za kombinovanje vina i hrane. U isto vrijeme, proizvođač dobija status određene flaše (npr. u prodavnici, na stolu, otvorena). Osim toga, ako je otvorena i konzumirana, potrošač može da iskoristi opciju da ocijeni vino i pruži povratne informacije vinaru.

The objective of this pilot project was to use the TagItSmart (TIS) platform to implement and execute a fully functional pilot for brand protection and anti- counterfeiting in wine industry. The pilot used various TIS architectural components supported by Smart tags, based on QR codes and functional inks, that can be used on wine bottles throughout their life cycle. The brand protection pilot included some functionality from digital product and lifecycle management use cases of the TIS project. During pilot implementation period, Smart tags have been made by TagItSmart partners DURST and VTT whereas project TagItWine team closely collaborated also with DunavNET, DURST and mr Rob van Kranenburg.

Različite vrste vina su označene Smart Tag-ovima i poslate na tržište (najviše Vranac, Vranac Pro Corde, manje količine Vladike i Luče, a najmanje skupih poput Vranac Reserve i Premijer). U cilju diseminacije TagItWine projekta organizovano je nekoliko promocija u najvećem lokalnom maloprodajnom lancu supermarketa, kao i u vinotekama kompanije "13. jul Plantaže".

Da bi sepravilno pratilo skeniranje i otkrili mogući problemsa autentičnošću, razvijen je ekran kontrolne table. Pored toga, anketirani su i drugi kupci i vinari. Istraživanje za vinare dizajnirano je da procijeni ključne teme u vezi sa falsifikovanjem vina, održivošću projekta i mogućnošću integracije TagItWine-a sa postojećim informacionim sistemima koje koriste vinari.

The application available for Android and iOS was developed and by scanning the QR code with the specific letters via smartphones, consumers obtained information about the wine authenticity, type of wine, vintage and also about producer, recommendations for matching wine with food etc. At the same time, producer received the status of the particular bottle (i.e. in stores, on table, opened). Besides, if opened and consumed, consumer could utilize the option to rate the wine and provide feedback to winemaker.

Different kinds of wine have been labelled with Smart Tags and sent to the market (the most Vranac and Vranac Pro Corde, less quantity of Vladika and Luča, and the least of expensive ones such are Vranac Reserve and Premijer). In order to disseminate and TagItWine project and kick-off pilot execution several demonstrations have been organized in the biggest local supermarket retail chain, as well in the wine stores of the company "13. jul Plantaže". In order to properly track scans and detect possible authenticity issues dashboard screen has been developed.

Besides, during pilot execution both customers and other winemakers have been surveyed. The survey for winemakers has been designed to assess crucial topics regarding wine counterfeiting, project viability and possibility to integrate TagItWine with existing information systems used by winemakers. Obtained results within the project showed that it is not an easy task to estimate the rate of success of system meaning that even if the system is put in place it would not guarantee a 100% prevention of counterfeit, but even smaller success rate such as 20-30% could generate a significant benefit for producers both in terms of profit loss and brand protection.

Dobijeni rezultati u okviru projekta pokazali su da procjena stope uspješnosti sistema nije lak zadatak, što znači da iako sistem bude postavljen, on ne bi garantovao stopostotnu prevenciju falsifikata, ali čak i manje stope uspješnosti kao npr. 20-30% mogu donijeti značajnu korist proizvođačima u pogledu smanjenja gubitka dobiti i zaštite robne marke.

Sa prosječnom godišnjom proizvodnjom od 17 miliona flaša, sa cijenama od 1,37 do 119,85 po flaši, godišnji prihod Plantaža mjeri se desetinama miliona eura. Imajući u vidu cifre udjela falsifikovanog vina, kompanija Plantaže sprovela je istraživanje u periodu od 2013-2014. godine, koje je pokazalo da je problem falsifikovanja primjećen u lancu supermarketa u Rusiji, a nanesena šteta procijenjena je na preko 300.000 € u samo jednoj godini.

Imajući ovo na umu, ulaganje u rješenja koja sprečavaju falsifikovanje i omogućavaju zaštitu brenda mogla bi donijeti višestruku korist proizvođačima vina.

With the average annual production of 17mil. bottles, with prices ranging from 1.37 to 119.85 per bottle, Plantaže's annual revenue is measured in tens of millions of euros. Having counterfeit market share numbers in mind, a research by Plantaže was done in 2013-2014 and showed that counterfeiting issue noticed in a supermarket chain in Russia caused damage estimated of over 300,000 € for one year. Having this in mind, investing in anti-counterfeiting and brand protection solutions could bring benefit to wine producers on multiple levels.

Pripremio/Prepared by:
Sektor za razvoj/Sector for development,
 "13. jul Plantaže" a.d.

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Hackaton - inovativno studentstko natjecanje

Hackathon – innovative student competition

Radni paket 3 (3.1.) Unapređenje znanja profesora i studenata o takmičenjima studenata - hakatonima

Work package 3 (3.1.) Improved teachers and students knowledge on student pitching competitions - hackatons

Studentska natjecanja vrlo su popularan alat koji studentima pruža praktično iskustvo, ali im omogućuje i stjecanje različitih poslovnih vještina poput rada u timu, lederstva, poslovne prezentacije i komunikacije te mnogih drugih. Jedan od najčešće organiziranih studentskih natjecanja je hakaton (hackathon) koji je u fokusu radnog paketa 3 projekta VIRAL.

Student competitions are the popular tool which provides students with practical experience as well as different business skills such as teamwork, leadership, business presentation, communication and many others. One of the most commonly organized student competitions is hackathon, which is in focus of the WP3 of the VIRAL project.

Voditelji radnog paketa 3 (Inovaciono preduzetnički centar Tehnopolis, Inovacioni centar Banja Luka, INTERA Tehnološki Park i Crnogorska asocijacija za nove tehnologije) u lipnju 2020. godine pripremili su vodič za organizaciju hacakthona.

WP3 leaders (Innovation and Entrepreneurship Center Tehnopolis, Innovation center Banja Luka, INTERA Technology Park and Montenegrin Association for New Technologies) prepared the guide for the hackathon organization in June 2020.

Brošura je pokrila sljedeće teme:
- Generalne informacije o hackathonu (pojam, povijest, vrste hackathona, ciljne skupine)
- Ključne korake u organizaciji hackathona
- Primjere iz okruženja
- Korisne linkove

Brošuru je moguće preuzeti ovdje.

The brochure covered the following topics:
- General information on hackathon (term, history, types, target groups)
- Key steps in hackathon organization
- Examples from surrounding
- Useful links

Brochure can be downloaded here.

Na osnovu brošure kreiran je i video vodič za organizaciju hackathonu koji je moguće pregledati ovdje.

Na osnovu brošure i video vodiča razvijen je detaljan plan organizacije hackathona u Banja Luci, Mostaru i Nikšiću koji su planirani za proljeće 2021. godine. Uz podršku vodtitelja radnog paketa 3, projektni partneri će organizirati hackathone fokusirane na primjenu IKT-a u poljoprivredi.

Pripremila/Prepared by:
Ana Bogdanović, INTERA

Video guide for the hackathon organization, which can be watched here, has been created based on the brochure.

Detailed plan for the organization of hackathons in Banja Luka, Mostar and Nikšić planned for the spring of 2021 has been developed based on brochure and video guide. With the support of the WP3 leaders, project partners will organize hackathons focused on applying ICT in agriculture.

Pravo u METU

U Mostaru, 2016. godine biva organizirano IT takmičenje u rješavanju problema iz stvarnog svijeta.

Kompanije "Hepok" i "Hercegovinalijek", predstavile su sljedeće probleme u agrikulturi kojima se susreću u toku poslovanja:

- Menadžment navodnjavanja
- Praćenje rada radnika na plantažama

Kompanija "Hepok" susretala se s problemom efikasnog menadžmenta navodnjavanja, a "Hercegovinalijek" nije imala mogućnost da efikasno prati rad svakog radnika pojedinačno, tj koliko gajbi grožđa uberu.
Više timova je sudjelovalo u rješavanju problema međutim, dva su se pokazala uspješna na kraju.

Tim AOX osvaja prvo mjesto u kategoriji "Menadžment navodnjavanja" s uređajem koji na tri nivoa mjeri vlažnost tla, te o istom obavještava korisnika putem aplikacije.

Tim META5 osvaja prvo mjesto u kategoriji "Praćenje rada radnika na plantažama" s rješenjem koje koristi barkod skenere koji skeniraju svaku gajbu grožđa, te putem aplikacije obavještava korisnika o radu svakog radnika pojedinačno.

Straight to the Point

In Mostar, in 2016, an IT competition in solving real-world problems was organized.

The companies Hepok I Hercegovina lijek, presented the following problems in agriculture that they encounter in the course of business:

- Irrigation management
- Monitoring the efficiency of plantation workers

The company "Hepok" encountered the problem of efficient irrigation management, and "Hercegovinalijek" did not have the opportunity to efficiently monitor the work of each worker individually, ie how many boxes of grapes are harvested.
Several teams were involved in solving the problem however, two proved successful in the end.

The AOX team won first place in the category „Irrigation Management" with a device that measures soil moisture on three levels, and informs the user about it through the application.

The META5 team won first place in the category "Monitoring the efficiency of plantation workers" with a solution that uses barcode scanners that scan each crate of grapes, and through the application informs the user about the work of each worker individually.

Tromjesečno mentorstvo i novčana nagrada u iznosu od 3000KM bile su nagrada za uspjeh na takmičenju. Cilj mentorstva bio je pretvoriti konceptualno rješenje u stvarnost, a nakon što je isto uspješno realizirano, rješenja su predstavljena na finalnoj CityOS konferenciji u Mostaru.
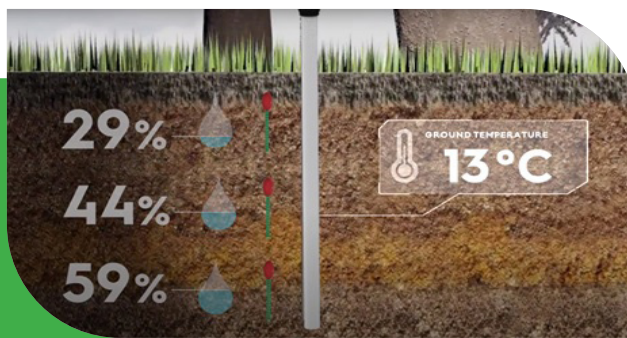
Oba tima bivaju odabrana među Top 10 Start-upa u BiH, a potom primaju pozivnice na PODIM Konferenciju radi predstavljanja rješenja široj masi. Tim AOX biva odabran među Top 20 ideja u Mariboru u Sloveniji. Nakon PODIM Konferencije prijavljuju se na Katana Project u Stuttgartu u Njemačkoj.

Od oko 1200 prijavljenih timova odabrani su među Top 100, te ostvarili pravo učešća na takmičenju u Stuttgartu. U Stuttgartu, prezentacija tima META5 biva odabrana među 10 najboljih u Evropi. Medijski popraćen uspjeh timova skrenuo je pažnju stranih investitora koji su tražili usluge razvoja softverskih rješenja.

Krenuvši s poljoprivredom, timovi AOX I META5 se udružuju u jednu softversku kompaniju koja je danas poznata kao "META5 d.o.o."

Danas,već 4 godine uspješno surađuju sa stranim tržištem kreirajući mnoga popularna softverska rješenja.

A three-month mentorship and a cash prize in the amount of 3000 KM were a reward for success in the competition.

The goal of the mentoring was to turn the conceptual solution into reality, and after the same was successfully realized, the solutions were presented at the final CityOS conference in Mostar.

Both teams were selected among the Top 10 Start-ups in BiH, and then received invitations to the PODIM Conference to present the solution to the general public.

The AOX team is selected among the Top 20 ideas in Maribor, Slovenia.

After the PODIM Conference they apply for the Katana Project in Stuttgart, Germany.

Out of about 1200 registered teams, they were selected among the Top 100, and gained the right to participate in the competition in Stuttgart.

In Stuttgart, the presentation of the META5 team is selected among the top 10 in Europe.

The media coverage of the teams' success drew the attention of foreign investors who sought software development services.

Starting with agriculture, the AOX and META5 teams merge into one software company known today as "META5 d.o.o."

Today, they have been successfully cooperating with the foreign market for 4 years, creating many popular software solutions.

Pripremio/Prepared by:
Faris Seferagić, META5 d.o.o.

Projektne prijave za odabrane šeme finansiranja

Radni paket 2 (2.5) – Izgradnja kompetnecija u obrazovanju u poljoprivredi

Project applications for selected funding schemes

Work package 2 (2.5) - Building competences in AET

Unapređenje efikasnosti gajenja šljive mehanizovanjem radnih operacija uz podršku informativnih tehnologija

Univerzitet u Banjoj Luci Poljoprivredni fakultet
Univerzitet u Mariboru, Slovenija
Univerzitet poljoprivrednih nauka i veterinarske medicine u Bukureštu, Rumunija

Poljoprivredni fakultet Univerziteta u Banjoj Luci je nosilac jednog od 5 projekata koji će se finansirati u okviru pilot-programa "Sinergija" Ministarstva za naučnotehnološki razvoj, visoko obrazovanje i informaciono društvo Republike Srpske.

Cilj projekta jeste ispitivanje uticaja mehanizovane rezidbe šljive u cilju podizanja efikasnosti proizvodnje. Upotreba informativnih tehnologija u okviru projekta biće bazirana na oceni stepena vegetacije (vegetacioni indeksi) i određivanja optimalnog trenutka rezidbe. Obzirom da je reč o većim proizvodnim zasadima, bez upotrebe satelitskih snimaka i dronova sa kamerom, teško je odrediti pozicije na kojima je optimalno primeniti rezidbu. Ideja je da se i veći broj drugih operacija na velikim proizvodnim površinama podrži informativnim tehnologijama, gde god je to moguće i time proizvodnja učini sigurnijom i efikasnijom.

Improving the efficiency of plum cultivation by mechanizing work operations with the support of information technologies

Univeristy of Banja Luka Faculty of Agriculture
University of Maribor, Slovenia
University of Agronomic Sciences and Veterinary Medicine, Romania

The Faculty of Agriculture of the University of Banja Luka is lead partner of one of the 5 projects funded under the pilot program of Ministry for Science and Techological Development, Higher Education and Information Society of Republika Srpska, "Synergy".

Aim of the project is to test impact of mechanized plum cultivation in order to increase production efficiency. The use of information technologies within the project will be based on an assessment of the degree of vegetation (vegetation indexes) and determining the optimal time of pruning. Given that these are larger producers, without the use of satellite imagery and camera drones, it is difficult to determine the positions where pruning is optimally applied. The idea is to support a larger number of other activities on large production areas with information technology, wherever possible, making production safer and more efficient.

Mapiranje potencijala za korištenje obnovljivih izvora energije u vinogradarstvu i vinarstvu
MAPEN

13. JUL – PLANTAŽE a.d. Podgorica,
UDG - Univerzitet Donja Gorica (Podgorica),
INTERA Tehnološki Park Mostar

Cilj projekta je da identifikovati i izmjeriti potencijale za primjenu obnovljivih izvora energije (OIE) u sektoru vinogradarstva i vinarstva, u geografskoj zoni u kojoj se nalaze vinogradi kompanije 13. JUL – PLANTAŽE a.d. Primjena rješenja za korišćenje OIE u sektoru vinogradarstva su u globalnom smislu i dalje relativno slabo zastupljena, a vinski region, po pravilu, karakteriše veliki broj sunčanih dana. Navedena rješenja su vrlo rijetko primijenjena i u regionima zapadnog Balkana, između ostalog i u Crnoj Gori. Jedna od najprimjerenijih kompanija koja ima sve preduslove da bude avangarda u ovom smislu u regionu je kompanija „13. JUL – PLANTAŽE" a.d. Podgorica.

Cilj projekta je steći jasniju sliku o mogućnostima primjene tehnologija OIE u sektoru vinogradarstva i vinarstva u Crnoj Gori.

Na osnovu trenutnog nivoa korištenja OIE u poljoprivredi u svijetu i regionu, uočena je potreba za jasnijom slikom o mogućnostima primjene tehnologija OIE u sektoru vinogradarstva i vinarstva u Crnoj Gori, što je i generalni cilj projekta.

Specifični cilj 1:
Steći jasnu sliku o kapacitetima i mogućnostima primjene OIE u segmentima primarne (vinogradi) i sekundarne (vinarija) proizvodnje u okvirima kompanije 13. Jul – PLANTAŽE a.d., ali i u Crnoj Gori generalno.

Specifični cilj 2:
Praktično demonstrirati korištenje energije sunca (fotonapon) u vinogradarstvu i vinarstvu, energetskoj potrošnji relevantnih vinarija u CG, razradu i implementaciju fotonaponskog pilot postrojenja za utilizaciju energije sunca u okviru kompanije 13. JUL – PLANTAŽE, te u konačnici evaluaciju i analizu potencijala za primjenu OIE u vinarstvu CG generalno.

Generalni rezultat projekta su stvoreni preduslovi za buduće značajno veće korištenje OIE kako u kompaniji 13. Jul - PLANTAŽE a.d., a tako i u vinarskom i poljoprivredno-prehrambenom sektoru u Crnoj Gori.

Za više informacija: http://viralerasmus.org/#

Mapping the potential for the use of renewable energy sources in viticulture and winemaking in Montenegro
MAPEN

JULY 13 - PLANTAŽE a.d. Podgorica,
UDG - University of Donja Gorica (Podgorica),
INTERA Technology Park Mostar

The aim of the project is to identify and measure the potential for the application of renewable energy sources (RES) in the sector of viticulture and winemaking, in the geographical zone where the vineyards of the company 13. JUL - PLANTAŽE a.d. The application of solutions for the use of RES in the viticulture sector is still relatively underrepresented in the global sense, and the wine region, as a rule, is characterized by a large number of sunny days. These solutions are very rarely applied in the regions of the Western Balkans, including Montenegro. One of the most appropriate companies that has all the prerequisites to be avant-garde in this regard in the region is the company „13. JULY - PLANTAŽE "Podgorica.

The aim of the project is to gain a clearer picture of the possibilities of applying RES technologies in the sector of viticulture and winemaking in Montenegro.

Based on the current level of RES use in agriculture in the world and the region, there is a need for a clearer picture of the possibilities of applying RES technologies in the viticulture and winemaking sector in Montenegro, which is the general goal of the project.

Specific objective 1:
Gain a clear picture of the capacities and possibilities of application of RES in the segments of primary (vineyards) and secondary (winery) production within the company 13. Jul – PLANTAŽE, but also in Montenegro in general.

Specific objective 2:
Practically demonstrate the use of solar energy (photovoltaic) in viticulture and winemaking, energy consumption of relevant wineries in Montenegro, development and implementation of photovoltaic pilot plant for solar energy utilization within the company JULY 13 - PLANTAŽE, and finally evaluation and analysis of RES potential in winemaking in Montenegro in general.

The general result of the project is the creation of preconditions for the future significantly greater use of RES in the company July 13 - PLANTAŽE, as well as in the wine and agri-food sector in Montenegro.

For more information: http://viralerasmus.org/en/home/

WP 7. Diseminacijom i komunikacijom ka uspešnoj realizaciji projekta

U predhodnom periodu, projekat je predstavljen široj društvenoj zajednici na različitim skupovima i događajima. Donosimo informacije o najznačajnijim.

Prezentacija projekta VIRAL na Univerzitetu Džemal Bijedić

P ovodom obilježavanja 43. godine od osnivanja Univerziteta "Džemal Bijedić" u Mostaru, 14.2.2010. u prostorijama Fakulteta informacijskih tehnologija – FIT UNMO održana prezentacija međunarodnih projekata. Agromediteranski fakultet Mostar – UNMO je predstavio ERASMUS+ CBHE projekat "Vitalising ICT relevance in agricultural learning" – VIRAL. Tom prilikom predstavljeni su glavni i specifični ciljevi projekta, partneri u implementaciji, kao i radni paketi. Ukazano je na značaj korištenja i razvijanja informacijskih tehnologija u poljoprivredi s ciljem jačanja konkurentnosti i povećanja uspješne proizvodnje koja može odgovoriti zahtjevima savremenog doba

Za više informacija:
http://viralerasmus.org/prezentacija-projekta-viral-na-univerzitetu-dzemal-bijedic/
Pripremila/Prepared by:
Alisa Hadžiabulić, UNMO

WP 7. Dissemination and communication towards successful project implementation

I n the previous period, the project was presented to the wider community at various gatherings and events. We bring information about the most important.

Presentation of the project at Džemal Bijedić University

O n the 43rd anniversary of founding Džemal Bijedić University in Mostar, on February 14, 2020. presentation of international projects was held at the premises of the Faculty of Information Technology – FIT UNMO. Faculty of Agriculture Mostar – UNMO presented ERASMUS + CBHE project "Vitalizing ICT relevance in agricultural learning" – VIRAL. On this occasion, the main and specific objectives of the project, implementation partners, as well as work packages were presented. The importance of using and developing information technologies in agriculture is emphasized in order to enhance competitiveness and increase successful production that can meet the requirements of modern times. Project VIRAL is funded by European Union through the Erasmus+ programe.

For more information:
http://viralerasmus.org/en/presentation-of-the-project-viral-at-dzemal-bijedic-university/

Povezivanje sa drugim Erasmus+ projektima

U okviru Erasmus+ projekta BENEFIT (https://www.project-benefit.eu/), održan je trening seminar za nastavno osoblje na temu "Deep Learning in a Classrooom" u Banja Luci u periodu 19-20.12.2019. Domaćin sastanka bio je Elektrotehnički fakultet Univeziteta u Banja Luci. U okviru prvog dana sastanka predstavljen je i projekat VIRAL (https://www.project-benefit.eu/wp-content/uploads/2019/12/BENEFIT-Teacher-training-seminar-UNIBL-final.pdf) u cilju upoznavanja prisutnih sa planiranim aktivnostima na projektu i potencijalne međuprojektne saradnje.

Za više informacija:
http://viralerasmus.org/predstavljanje-projekta-viral-na-elektrotehnickom-fakultetu-univerziteta-u-banja-luci/

Pripremio/Prepared by:
Đurađ Hajder, UNIBL

Predstavljanje projekta VIRAL tokom održavanja AGRORES 2020

Projekat VIRAL Erasmus+ je predstavljen široj akademskoj javnosti tokom održavanja IX. međunarodnog naučnog simpozijuma poljoprivrednih nauka i XXV. savjetovanja inženjera poljoprivrede Republike Srpske – AGRORES 2020, koji se ove godine organizuje online. Simpozijum se održavao 24.09.2020. godine. U okviru izlaganje pod nazivom "VITALISING ICT RELEVANCE IN AGRICULTURAL LEARNING" prezentovani su ne samo ciljevi projekta, već i preliminarni rezultati.

Za više informacija:
http://viralerasmus.org/predstavljanje-projekta-viral-tokom-odrzavanja-agrores-2020/

Pripremila/Prepared by:
Đurađ Hajder, UNIBL

Connecting with other Erasmus + projects

Within the framework of the Project BENEFIT (https://www.project-benefit.eu/), teacher training seminar "Deep Learning in a Classrooom" was held on 19th and 20th of December 2019, at the University of Banja Luka. The meeting was hosted by the Faculty of Electrical Engineering, University of Banja Luka. As part of the first day of the meeting, the VIRAL project (https://www.project-benefit.eu/wp-content/uploads/2019/12/BENEFIT-Teacher-training-seminar-UNIBL-final.pdf) was presented in order to get acquainted present with planned project activities and potential inter-project cooperation.

For more information:
http://viralerasmus.org/en/presentation-of-the-viral-project-at-the-faculty-of-electrical-engineering-university-of-banja-luka/

Presentation of VIRAL project at AGRORES 2020

The VIRAL Erasmus + project was presented to the wider academic public during the IX International Scientific Symposium of Agricultural Sciences and the XXV Conference of Agricultural Engineers of the Republic of Srpska – AGRORES 2020, which is being organized online this year. The symposium will be held on September 24, 2020. years. Within the presentation entitled "VITALISING ICT RELEVANCE IN AGRICULTURAL LEARNING", not only the goals of the project, but also the preliminary results were presented.

For more information:
http://viralerasmus.org/en/presentation-of-viral-project-at-agrores-2020/

Diseminacija neophodna za uspešnu implementaciju projekta

Na Univerzitetu u Bijeljini održan je prvi u nizu diseminacioni sastanak 25.9.2020. godine. Sastanak je prvashodno bio namijenjen zaposlenom osoblju i studentima Univerziteta, ali i drugim zainteresovanim subjektima u oblasti agrara. Aktivnost se realizovala u okviru Erasmus+ VIRAL projekta, a u okviru radnog paketa sedam (WP7)

Za više informacija:
http://viralerasmus.org/odrzan-prvi-u-nizu-diseminacioni-sastanak-u-bijeljini/

Pripremio/Prepared by:
Miroslav Nedeljković, UB

Dissemination necessary for successful project implementation

First dissemination meeting was held at the University of Bijeljina on September 25, 2020. The meeting was primarily intended for employees and students of the University, but also for other interested subjects in the field of agriculture. The activity was realized within the Erasmus+ VIRAL project, and within the work package seven

For more information:
http://viralerasmus.org/en/first-dissemination-meeting-held-in-bijeljina/

Razvoj kurikuluma za rješavanje novih izazova u ICT obrazovanju

InTsikt 2020. je međunarodni simpozij koji se održava na godišnjem nivou, na kojem industrija, akademska zajednica i vladine institucije razmjenjuju znanje i iskustva unutar ICT domene. Simpozij tradicionalno organizuju Elektrotehnički fakultet - Univerzitet u Tuzli, Elektrotehnički fakultet - Univerzitet u Ljubljani i BIT Centar Tuzla. Glavna tema InTsikta 2020 bila je „Razvoj kurikuluma za rješavanje novih izazova u ICT obrazovanju". Broj sudionika bio je 131.

Kako bi pokazali sinergiju, usklađenost i saradnju između ERASMUS + projekata, dva su projekta predstavila svoju aktivnost i rezultate: ELEMEND i VIRAL.

InTsikt 2020 održan je 16. i 17. novembra 2020. godine. Zbog pandemije Covid-19, simpozij je održan online putem platforme Zoom.

Curriculum Development to Address New Challenges in ICT Education INTSIKT 2020

INTSIKT 2020 is an annual international symposium where industry, academia and government institutions exchange knowledge and experiences within the ICT domain. The symposium is traditionally organized by the Faculty of Electrical Engineering University of Tuzla, Faculty of Electrical Engineering University of Ljubljana and BIT Center Tuzla. The main topic of InTsikt 2020 was "Curriculum Development to Address New Challenges in ICT Education". The number of participants was 131.

In order to show synergy, harmonization and collaboration between ERASMUS + projects, two projects presented their activity and results: ELEMEND and VIRAL.

InTsikt 2020 took place on 16. and 17. November 2020. Due to covid-19 pandemic, this symposium was implemented online through Zoom platform.

Na konferenciji su predstavljene sljedeće teme:

1. **"BENEFIT osvrt na projekat" - Andrea Tonello,** Alpe Adria Univerzitet, Klagenfurt
2. **"BENEFIT ishodi - WP2" - Aljo Mujčić,** Univerzitet u Tuzli
3. **"BENEFIT ishodi- WP3" - Vlado Delić,** Univerzitet Novi Sad
4. **"BENEFIT ishodi - WP4" - Mladen Koprivica,** Univerzitet u Beogradu
5. **"Stvaranje dinamičnog okruženja za učenje, za studente poljoprivrede u BiH i CG"** (VIRAL Erasmus+ projekat) **- Miljan Cvetković,** Univerzitet u Banja Luci,**S. Grobelnik-Mlakar S,** Univerzitet u Mariboru, **A. Hadziabulić A,** Univerzitet u Mostaru
6. **"Usklađivanje WBC BSc i MSc kurikuluma s paradigmom pametne mreže"** (ERASMUS + projekat ELEMEND) **- Tatjana Konjić,** Univerzitet u Tuzli, **Aphrodite Ktena,**National and Kapodistrian Univerzitet u Ateni
7. **"Iskustva studenata koji sudjeluju u projektu BENEFIT " – Okrugli stol**

Za više informacija:
http://viralerasmus.org/projekat-viral-na-intsikt-2020/

Naučni skup STES 2020

U periodu od 26. do 28. novembra 2020. godine na Univerzitetu u Banjoj Luci održan je 13. multidisciplinarni naučno-stručni skup "Studenti u susret nauci – StES 2020" sa međunarodnim učešćem. Ove godine sekcija za poljoprivredne nauke je održana u prostorijama Poljoprivrednog fakulteta. U cilju najave aktivnosti u okviru radnog paketa 3 (WP3) VIRAL projekta, predstavljene su aktivnosti na organizaciji hakatona namenjenih studentima poljoprivrede i elektrotehnike. Ispred grupe autora saopštenje pod nazivom: "NOVI OBLICI EDUKACIJE I RAZVOJA PREDUZETNIČKIH SPOSOBNOSTI STUDENATA" predstavila je student III ciklusa studija, mr Jelisaveta Seka-Cvijanović.

Za više informacija:
http://viralerasmus.org/stes-2020/
http://viralerasmus.org/odzana-skup-stes-2020/

Pripremila/Prepared by:
Tatjana Jovanović-Cvetković, UNIBL

Saradnjom prevazići izazove i povećati nivo upotrebe IKT u poljoprivredi

U cilju uspostavljanje projektne saradnje 17.12.2020. godine predstavnici VIRAL projekta (UNIBL i WEBIN) su imali konstruktivan razgovor sa predstavnicima Privredne komore Republike Srbije i učesnicima projekta "Scaleup4europe".

Projekat se realizuje u okviru poziva H2020 i u prvi plan stavlja saradnju sa biznis sektorom u različitim oblastima primene inovativnih tehnologija. Jedna od oblasti je i poljoprivreda (Agtech) kojom rukovodi privredna komora iz Srbije.

Dogovorena je saradnja na nivou projekta koja će poseban značaj imati u kreiranju kurseva za biznis sektor (RP2) i njihovoj implementaciji (RP5), učešće na Expo događaju (RP4) i različitim oblicima diseminacionih aktivnosti (RP7).

Za više informacija:
http://viralerasmus.org/saradnja-na-nivou-projekta-u-cilju-uspesnije-realizacije/

Pripremio/Prepared by:
Marko Stojanović, WEBIN

The following topics were presented at the conference:

1. **"BENEFIT project overview" - Andrea Tonello,** Alpe Adria University, Klagenfurt
2. **"BENEFIT outcomes - WP2" - Aljo Mujčić,** University of Tuzla
3. **"BENEFIT outcomes - WP3" - Vlado Delić,** University of Novi Sad
4. **"BENEFIT outcomes - WP4" - Mladen Koprivica,** University of Belgrade
5. **"Creation of Dynamic Learning Environment for Agricultural Students in B&H and MNE"** (VIRAL Erasmus+ project) **- Miljan Cvetković, University of Banja Luka,S. Grobelnik-Mlakar S,** University of Maribor, **A. Hadziabulić A,** University of Mostar
6. **"Aligning WBC BSc and MSc curriculum with the smart grid paradigm"**(ERASMUS + project ELEMEND) **- Tatjana Konjić,** University of Tuzla, **Aphrodite Ktena,**National and Kapodistrian University of Athens
7. **"Experience of students participating in BENEFIT project" - Round table**

For more information:
http://viralerasmus.org/en/project-viral-on-intsikt-2020/

Pripremio/Prepared by:
Aljo Mujčić, UNTZ

Scientific meeting STES 2020

In the period from 26 to 28 November 2020, the 13th multidisciplinary international scientific academic meeting "Students Encountering Science – StES 2020" with international participation was held at the University of Banja Luka. This year, the section for agricultural sciences was held at the Faculty of Agriculture. In order to promote the activities within the work package 3 (WP3) of VIRAL project, the activities on the organization of hackathons intended for students of agriculture and electrical engineering were presented. In front of the group of authors, a presentation entitled: "NEW FORMS OF EDUCATION AND DEVELOPMENT OF ENTREPRENEURSHIP ABILITIES OF STUDENTS" was presented by a student of the III cycle of studies, Jelisaveta Seka-Cvijanović, MA.

For more information:
http://viralerasmus.org/en/stes-2020-2/
http://viralerasmus.org/en/scientific-meeting-stes-2020/

Cooperation to overcome challenges and increase the level of ICT use in agriculture

In order to establish project cooperation on December 17th, 2020. representatives of the VIRAL project (UNIBL and WEBIN) had a constructive conversation with representatives of the Chamber of Commerce and Industry of the Republic of Serbia and participants in the "Scaleup4europe" project.

The project is implemented within the call H2020 and puts in the foreground cooperation with the business sector in various areas of application of innovative technologies. One of the areas is agriculture (Agtech), which is managed by the Serbian Chamber of Commerce and Industry.

Cooperation at the project level has been agreed, which will be of special importance in the creation of courses for the business sector (WP2) and their implementation (WP5), participation in the Expo event (WP4), and various forms of dissemination activities (WP7).

For more information:
http://viralerasmus.org/en/cooperation-at-the-project-level-for-more-successful-implementation/

Pametni grad koristi pametne alate da napravi pametna sela
Grad Gradiška (BiH) - uspješna priča

Smart City use smart tools to make Smart Villages
City of Gradiska (BiH) - successful story

In the coming years, use of efficient information technologies will play an increasingly important role in agriculture production and natural resource management. In this context Geographic Information System (GIS) has a significant role to play in the decision making process in agriculture at various levels i.e., field, regional, national and global levels.

The GIS is an excellent informative tool that enhances visualization and ease of analysis and handling of spatial data. This spatial information technology allows to examine and analyze a wider range of agricultural related resources such as soil, weather, hydrology, various socio-economic variables simultaneously and accurately. Simultaneous examination of all these variables in a GIS environment leads to a better understanding of how agricultural systems function and interact over space and time. This understanding leads to developing stable and sustainable dynamic agricultural technologies. Soil is one of the most important natural resources, which is a limited and very difficult to renew, and sometimes non-renewable resource due to very slow formation and regeneration processes, as opposed to the high rates of degradation to which it is exposed on a daily basis. Soil is characterized by multiple and multipurpose functions which are difficult

U godinama koje dolaze upotreba efikasnih informacionih tehnologija igraće sve značajniju ulogu u poljoprivrednoj proizvodnji i upravljanju prirodnim resursima. U tom kontekstu, Geografski informacioni sistem (GIS) ima značajnu ulogu u procesu donošenja odluka u poljoprivredi na različitim nivoima, tj. na nivou parcele, regionalnom, nacionalnom i globalnom nivou.

GIS je izvrsno informativno sredstvo koje poboljšava vizualizaciju i jednostavnost analize i rukovanja prostornim podacima. Ova prostorna informaciona tehnologija omogućava istovremeno i ispitivanje i analizu šireg spektra poljoprivrednih resursa poput zemljišta, vremena, hidrologije, različitih socio-ekonomskih promenljivih. Istovremeno ispitivanje svih ovih promenljivih u GIS okruženju dovodi do boljeg razumevanja kako poljoprivredni sistemi funkcionišu i komuniciraju u prostoru i vremenu. Ovo razumjevanje dovodi do razvoja stabilnih i održivo dinamičnih poljoprivrednih tehnologija. Zemljište predstavlja jedan od najvažnijih prirodnih resursa koji je ograničen i veoma teško obnovljiv, a ponekad i neobnovljiv resurs usljed veoma sporih procesa formiranja i regeneracije nasuprot visokim stopama degradacije kojima je izložen svakodnevno. Odlikuje se višestrukim i

to separate or inseparable from each other, and contemporary agriculture is faced with the difficult task of rational management of such a sensitive natural resource.

Knowing the quality of available land resources and constant care for them are the most important tasks that a responsible authority of one country can put ahead, but also local governments, in whose jurisdiction are the departments responsible for the design and implementation of planning documents related to land. As one of the most important activities which are legally required, and which the authorities in local communities can implement in order to evaluation and protection of land resources in their area, is to develop the strategic planning document „The Basis for Agricultural Land Protection, Use and Restructuring of agricultural land" for the territory of the municipality or city. The City Gradiška (BiH) recognized the importance of such a planning document, and started to create the Basis.

višenamjenskim funkcijama koje su teško odvojive ili neodvojive jedna od druge, te se pred današnju poljoprivredu postavlja težak zadatak racionalnog upravljanja jednim takvim osjetljivim prirodnim resursom.

Poznavanje kvaliteta raspoloživih zemljišnih resursa i konstantna briga o njima su najbitniji zadaci koje pred sebe mogu da stave odgovorne vlasti jedne države, ali i jedinica lokalne samouprave, u čijim su nadležnostima resori odgovorni za kreiranje i realizaciju planskih dokumenata koja se odnose na zemljišta. Kao jedna od najznačajnih aktivnosti, koje su zakonski obavezne, a koje vlasti u lokalnim zajednicama mogu da sprovedu, u cilju valorizacije i zaštite zemljišnih resursa na svom području, jeste izrada strateškog planskog dokumenta „Osnove zaštite, korišćenja i uređenja poljoprivrednog zemljišta" za teritoriju opštine, odnosno grada. Grad Gradiška (BiH) je prepoznao važnost ovakvog planskog dokumenta, te krenuo u izradu Osnove.

Područje grada Gradiška i Lijevča polja je tradicionalno uvijek smatrano za jednu od regija koje proizvode znatne količine hrane i sirovina za stanovništvo u Republici Srpskoj i BiH i uspješno u tome zadovoljava, kako sopstvene, tako i potrebe okolnih lokalnih zajednica, sve većeg broja stanovništva u urbanim zonama, a nerijetko i za izvoz.

Od ukupne površine zemljišta na području grada Gradiška, poljoprivredno zemljište zauzima 50.238 ha, dok šume 20.908 ha, odnosno u strukturi zemljišta poljoprivredno zemljište ima udio od 65,95%, a šume i šumsko zemljište 27,45%. Zbog svega toga, od posebne važnosti za budući razvoj poljoprivredne proizvodnje područja grada Gradiška je definisanje optimalnog načina korišćenja poljoprivrednog zemljišta i dodjele u odgovarajuće namjene, s ciljem podizanja njegove produktivnosti. Kako je proizvodnja hrane i sirovina na poljoprivrednom zemljištu među najvažnijim njegovim funkcijama, neophodno je sprovoditi njegovo kontinuirano uređenje, upravljanje i zaštitu od neracionalnog i nenamjenskog korišćenja, u cilju održivosti, kako samog ovog veoma važnog prirodnog resursa, tako i poljoprivrede, kao važne grane privrede u gradu Gradiška, a i šire.

The area of city Gradiska and Lijevče field has been traditionally considered as one of the regions that produce significant amounts of food and raw materials for the population in the Republic of Srpska and BiH and successfully satisfy, as their own, as well as the needs of the surrounding communities and the growing number of population in urban zones, and often for export.

Of the total land area on the teritory of city Gradiška, agricultural land occupies 50,238 ha (65,95%), while forests anf forest lands 20,908 ha (27,45). Because of all this, of particular importance for the future development of agricultural production areas of the city Gradiska is to define optimal way of agricultural land use and allocation of the appropriate purposes, in order to raise its productivity. As the production of food and raw materials on agricultural land is among its most important functions, it is necessary to implement its continuous planning, management and protection from irrational and improper use, in order to sustain this very important natural resource and agriculture as an important branch of the economy in the city of Gradiška, and wider.

Kao rezultat ovog projekta formirana je baza podataka o zemljištu u digitalnom obliku čijom se nadogradnjom, kombinovanjem i obradom mogu dobiti podaci korisni za dalja proučavanja ovog područja. Izrađene su karte pogodnosti zemljišta za gajenje najznačajnijih poljoprivrednih kultura na području grada Gradiška sa jasno definisanim agroekološkim zonama.
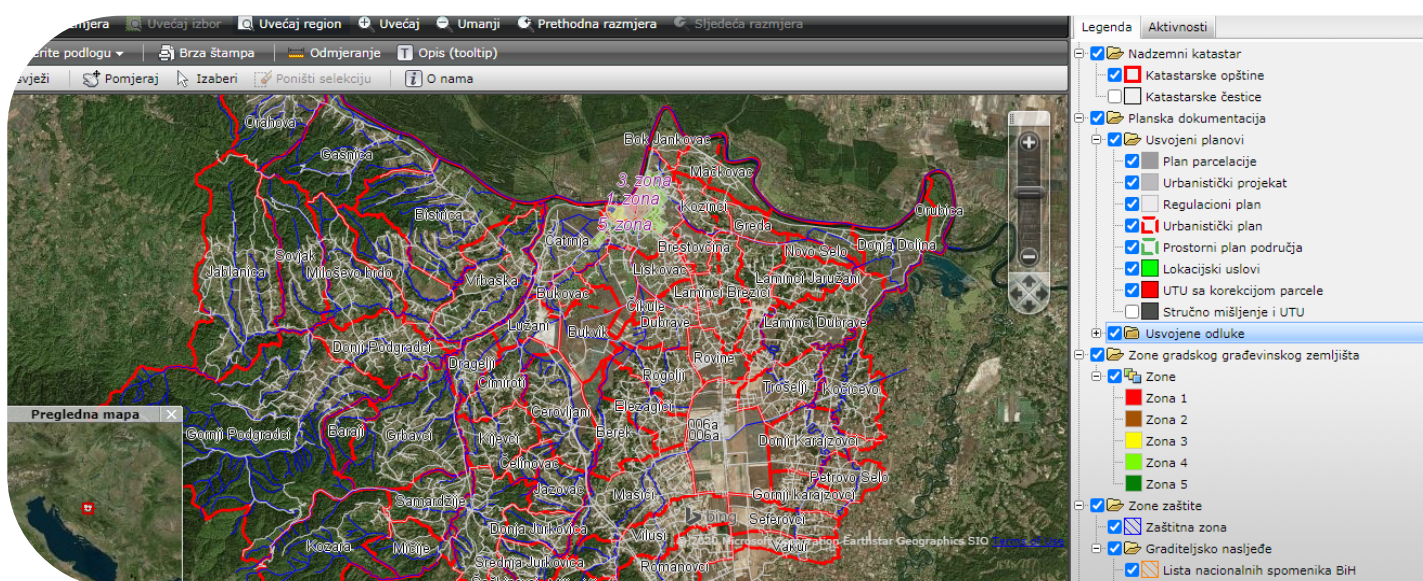
Takođe, kroz jedan drugi projekat kreiran je geoportal sa katastarskim parcelama i ostalim geodetskim podacima koji je komplementaran sa gore pomenutom GIS bazom podatatka o zemljištu, tako da donosioci odluka kao i sami farmeri imaju mogućnost da racionalno i brzo donose odluke i vrše praćenje prozvodnje i korišćenja određenih parcela.

As a result of this project, a land database was formed in digital form, which can be upgraded, combined and processed to provide data useful for further studies in this area. Maps of land suitability for growing the most important agricultural crops in the area of the city Gradiška with clearly defined agroecological zones were made.

Also, through another project, a geoportal with cadastral parcels and other geodetic data was created, which is complementary to the above-mentioned GIS soil database, so that decision makers and farmers themselves have the ability to rationally and quickly make decisions and carry out the monitoring of production and use of certain parcels.

Pripremili/Prepared by:

MSc Milan Šipka i prof. dr Mihajlo Marković
Univerzitet u Banjoj Luci   University of Banja Luka
poljoprivredni fakultet   Faculty of agriculture

HOLOSCOPE

http://www.holoscopeone.com

an IT company in the life sciences industry.

It is an innovation facility with 20+ team members, growing on fertile soil of US/Scandinavian- Bosnian cooperation in past 2 decades.

The team is a collaborative family of developers, mathematicians, electronics and robotics engineers, artists and medical professionals open to futuristic projects and challenges.

In collaboration with R&D companies from Norway and the US, HOLOSCOPE is launching new projects for young engineers and researchers in the Western Balkans region, working in the life-sciences domain and using VR/AR for new visual experiences, IoT, robotics, AI and other emerging technologies.

In partnership with researchers from IT and medical colleges, HOLOSCOPE offers unique development experiences in a research and development environment, in geographically distributed projects.

The company works in the following sectors:

SprayBot – developing a computer vision system for an agri-robot project for selective spraying in greenhouses,

Telehealth – developing NORMEDY, an mHealth platform for telemedicine services, connecting doctors and patients for remote consultations and Remote Patients Monitoring using wearable medical sensors and

VR/AR – working on VR/AR training simulators in medicine.

HOLOSCOPE

http://www.holoscopeone.com

je IT kompanija u industriji prirodnih nauka.

To je inovativni tim sa više od 20 članova, koji raste na plodnom tlu američko-skandinavsko-bosanske saradnje u protekle dvije decenije.

Tim je porodica saradnika, programera, matematičara, inženjera elektronike i robotike, umjetnika i medicinskih stručnjaka otvorenih za futurističke projekte i izazove.

U saradnji sa istraživačkim i razvojnim kompanijama iz Norveške i SAD-a, HOLOSCOPE pokreće nove projekte za mlade inženjere i istraživače u regiji Zapadnog Balkana, koji rade u domenu prirodnih nauka i koriste proširenu i virtuelnu stvarnost (VR/AR) za nova vizuelna iskustva, IoT, robotiku, vještačku inteligenciju i druge nove tehnologije.

U partnerstvu sa istraživačima sa informatičkih i medicinskih fakulteta, HOLOSCOPE nudi jedinstvena iskustva u istraživačkom i razvojnom okruženju, kroz geografski rasprostranjene projekte.
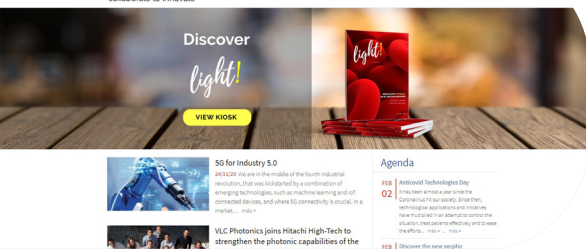
Kompanija radi u sljedećim područjima:

- **SprayBot** – razvoj sistema računarskog vida i projekta agro-robota za selektivno tretiranje biljaka u plastenicima,
- **Telehealth** – razvoj NORMEDY, telemedicinske platforme za povezivanja ljekara i pacijenata za daljinske konsultacije i daljinsko nadgledanje pacijenata pomoću medicinskih senzora i
- **VR/AR** – rad na simulatorima proširene i virtuelne stvarnosti za treninge u medicini.

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HoloSCOPE

A Life Sciences Company

HoloSCOPE is home to fans of life sciences. We are developers, mathematicians, clinicians, artists and researchers, passionate about how to make human life better and safer.

Technological innovation management for seed production

Optimizacija proizvodnje žitarica kroz deep tehnologije obezbjeđuje sigurnost hrane, uz smanjenje otpada i poboljšavajuči kvalitet i bezbjednost procesa u poljoprivredi. Ovo je od naročitog značaja u regionima kao što je Rosario u Argentini, gdje je locirano više od 50% poljoprivredne proizvodnje cijele zemlje.

Secpho, deep tehnološki klaster, lociran u Barseloni, sa više od 150 članova iz Španije i van zemlje (kompanije, istraživački centri i univerziteti) podstiče među-sektorsku saradnju usmjerenu na tehnološke inovacije okupljajući svoje članove i partnere iz više od 30 sektora, uključujući poljoprivredu kao jednu od strateški interesnih oblasti.

Ovaj vid saradnje je realizovan kroz organizaciju raznih događaja (on-line i off-line), kroz inovacione projekte, jedan od njih je u saradnji sa Privrednom komorom regiona Rosario iz Argentine, kao primjer aktivnosti na međunarodnom nivou.

Saradnja između klastera Secpho i Privredne komore Rosario je započeta u novembru 2018 godine, posjetom Argentinskih partnera, koja je rezultirala organizacijom radionice sa grupom članova Secpho klastera u Barseloni. U okviru ove aktivnosti predstavnici inovacione laboratorije iz Rosario su prezentovali izazove sa kojima se susreću u proizvodnji žitarica, dok su španski partneri predstavili potencijalna rješenja.

Potom je Secpho klaster organizovao propratne aktivnosti sa objema stranama (kompanije iz Španije i Privredna komora Argentine) što je rezultiralo sa dva inovaciona projekta od strane španskih kompanija i finansirano od strane latino-američkih partnera.

Oba projekta imaju za cilj razvijanje Internet stvari sistema za monitoring žitarica u stvarnom vremenu sa ciljem detekcije nepoželjnih elemenata u proizvodnji, što uključuje i sensorske uređaje za prikupljanje podataka kao i deep learning rešenja za njihovu obradu.

Za više informacija: https://www.secpho.org/en/

Upravljanje tehnološkim inovacijama za proizvodnju semena

Optimization of grain production through deep tech ensures food security, by reducing food waste, and improving quality and safety of agricultural processes. It is of particular importance in regions such Rosario in Argentina, where more than 50% agricultural production of the whole country is located.

Secpho, deep tech cluster based in Barcelona, with more than 150 members in Spain and beyond (companies, research centres and universities) fosters cross-sectoral collaboration oriented on technological innovation by bringing together its members and partners from more than 30 sectors, including agriculture as one of the strategic areas of interest.

Such cooperation is facilitated through different types of events, both on-line and off-line, and innovation projects, with those delivered together with the Rosario Chamber of Commerce from Argentina as an example of activities on international level.

The collaboration between secpho and chamber of commerce begun in November 2018 with the visit of the Argentinian partner to Barcelona resulting in workshop with a group of secpho´s members. During this event, representatives of the innovation lab from Rosario presented their challenges related to the production of grains, while Spanish entities explained their potential solutions.

After the event secpho performed follow-up activities with both sides (Spanish companies and Argentinian Chamber of Commerce) which resulted in two innovation projects delivered by Spanish companies and financed by Latin-American partners.

Both projects aimed to develop Internet of Things (IoT) systems for real-time grains monitoring to detect unwanted elements in the production lines, which included both sensor devices for data acquisiti on and Deep Learning solutions for data processing.

For more information: https://www.secpho.org/en/

Pripremio/Prepared by:
Gawel Walczak, secpho
Prevela: Sanja Radonjić,PLANTAŽE

VIRAL