



Prof. dr Vanja Asanović, direktorica Zavoda za metrologiju

Značajni rezultati u uspostavljanju metrološke sljedivosti



Jačanje administrativnih kapaciteta i obezbjeđenje namjenski izgrađenog poslovnog prostora za Zavod za metrologiju, Institut za standardizaciju i Akreditaciono tijelo Crne Gore svakako su važni zadaci za naredni period.

Glasnik: Kako se pandemija Covid-19 odrazila na poslovanje Zavoda za metrologiju Crne Gore? Koje su najvažnije aktivnosti koje ste realizovali u ovom periodu? Recite nam nešto više o njima.

V. Asanović: Pandemija bolesti Covid-19, koja je nenadano promijenila život ljudi na čitavoj planeti, uslovlila je i promjenu dinamike aktivnosti Zavoda za metrologiju. Nakon otkrića prvih slučajeva infekcije korona virusom u Crnoj Gori, u Zavodu su uvedene mjere prevencije prenosa zarazne bolesti u skladu sa odlukama Vlade Crne Gore, Ministarstva zdravlja, Instituta za javno zdravlje i Nacionalnog koordinacionog tijela za zarazne bolesti. U cilju smanjenja rizika od prenosa virusa među zaposlenim, kao i zaštite osoba koje su u većem riziku od razvoja komplikacija, zahtjevi klijenata su realizovani u smanjenom obimu do druge polovine maja 2020. godine. Poboljšanje epidemiološke situacije u Crnoj Gori, praćeno definisanjem pristupa koji podrazumijeva da privreda i društvo u cjelini, moraju funkcionisati u novim okolnostima, reflektovalo se i na djelatnost Zavoda. Obnovljen je normalan režim rada u pogledu sprovođenja postupaka ovjeravanja zakonskih mjerila u službenim prostorijama Zavoda i na teritoriji Crne Gore, kalibracije mjerila/etalona, kao i pregleda i žigosanja predmeta od dragocjenih metala. Posebna pažnja je posvećena primjeni mjera za sprječavanje prenosa novog korona virusa, tako da su zaštitne maske, viziri, mjerenje tjelesne temperature prilikom ulaska u službene prostorije Zavoda, poštovanje fizičke distance od najmanje dva metra i ograničavanje broja klijenata koji mogu boraviti ispred šalterskog dijela, postali nezaobilazan pratilac našeg rada. Ovjeravanje zakonskih mjerila u inostranim laboratorijama je bilo otežano, a u nekim slučajevima i nemoguće zbog nepovoljnih epidemioloških okolnosti ne samo u Crnoj Gori, već i u Evropi. Ipak, u saradnji sa našim klijentima pronašli smo najbolja rješenja za komplikovane zahtjeve, kako se ne bi usporili važni razvojni projekti u Crnoj Gori.

Analizom naših aktivnosti u periodu od 16. marta do 15. oktobra ove godine i poređenjem tih podataka sa prosječnim vrijednostima za isti period prethodne četiri godine, možemo zaključiti da je broj zahtjeva klijenata manji za oko 20 %, što je uticalo i na smanjenje naplaćenih naknada iz oblasti metrologije i dragocjenih metala za oko 25 %. Imajući u vidu uticaj pandemije Covid-19 na privredne grane, ne iznenađuje manji broj zahtjeva za ovjeravanje taksimetara, kao i pregled i žigosanje predmeta od dragocjenih metala.

Pandemija bolesti Covid-19 uslovlila je i odlaganje radionica koje su imale za cilj predstavljanje novih definicija jedinica međunarodnog sistema jedinica (SI sistema) prosvjetnim radnicima, kao i predstavnicima organa državne uprave čija se djelatnost odnosi na kreiranje nastavnih planova i pisanje udžbenika. Radionice posvećene promovisanju najboljih mjernih i kalibracionih mogućnosti Zavoda za metrologiju, kao i prikazivanju zakonskog okvira kojim je regulisana oblast ovjeravanja različitih mjerila u Crnoj Gori, takođe su odložene. Novi uslovi poslovanja za vrijeme pandemije Covid-19, nameću potrebu online predstavljanja edukativnih i promotivnih sadržaja.

Glasnik: Pojačani ste novim laboratorijama. Kako će one doprinijeti radu Zavoda i njegovih klijenata?

V. Asanović: Kontinuirano unapređujemo postupke rada i proširujemo

opseg akreditacije. Laboratorija za jonizujuća zračenja, u kojoj se čuvaju i održavaju radioaktivni izvori zračenja i razvijaju kalibracione i mjerne metode za određivanje koncentracije radona u vazduhu, novi je segment područja akreditacije Zavoda za metrologiju. Opremu za razvoj Laboratorije za jonizujuća zračenja je donirala Međunarodna agencija za atomsku energiju (IAEA) krajem 2017. godine u sklopu projekta MNE9004: "Unapređenje nacionalnog sistema za radon". Budući da je radioaktivni gas radon prepoznat kao uzročnik raka pluća, veoma je važno imati pouzdane informacije o njegovoj koncentraciji u školskim i poslovnim prostorijama, kao i objektima stanovanja. Tačnost instrumenata i sljedivost mjerenja direktno utiču na pouzdanost podataka koji se dobijaju mjerenjem. Uspostavljanjem Laboratorije za jonizujuća zračenja u okviru Zavoda, stvoreni su uslovi za kalibraciju instrumenata koji se primjenjuju za mjerenje koncentracije radona u vazduhu kako u Crnoj Gori, tako i u regionu.

Unapređenje zakonske metrologije u Crnoj Gori ogleda se u uspostavljanju Laboratorije za ovjeravanje etilometara, Laboratorije za ovjeravanje fonometara i Laboratorije za ovjeravanje analizatora izduvnih gasova. Etilometri se kao zakonska mjerila koriste u oblasti bezbjednosti saobraćaja, a poput fonometara i u funkciji zaštite imovine, životne sredine, prirodnih resursa, zaštite na radu i zaštite od nezgoda. Instaliranje opreme u okviru Zavoda za metrologiju i obuka stručnog kadra bili su preduslov za organizaciju ovjeravanja etilometara i fonometara u Crnoj Gori, umjesto u inostranim laboratorijama, što je veoma značajno za naše klijente posebno sa ekonomskog stanovišta.

Analizator izduvnih gasova je mjerni instrument koji služi za određivanje zapreminskog udjela određenih komponenata (CO, CO₂, O₂ i ugljovodonici) izduvnog gasa motora vozila. U cilju unapređenja postupaka ocjene usaglašenosti tih mjerila sa propisanim metrološkim zahtjevima, koja se koriste u stanicama za tehnički pregled motornih vozila, obezbijedena je neophodna oprema i sprovedena je edukacija zaposlenih u Zavodu za metrologiju. U narednom periodu će se intenzivirati saradnja sa nadležnim inspekcijским organima, kako bi se postupak ovjeravanja analizatora izduvnih gasova sprovodio u skladu sa propisanim normama.

Glasnik: Zavod za metrologiju Crne Gore u oktobru je dobio status posmatrača u okviru Bečke konvencije, odnosno u sklopu Međunarodnog ugovora o prekograničnoj trgovini predmetima od dragocjenih metala. Recite nam više o važnosti toga.

V. Asanović: Zavod za metrologiju sprovodi stručne i sa njima povezane upravne poslove u oblasti kontrole predmeta od dragocjenih metala u Crnoj Gori. Članstvo u Međunarodnom udruženju službe za analizu (IAAO) koje datira od 2012. godine, prekinuto je prestankom rada tog udruženja 31. decembra 2019. godine. Na nedavnom zasijedanju Bečke konvencije zaključeno je da je većina bivših članova IAAO, uspješno integrisana u Konvenciju gdje su dobili status "nečlana" ("Non-Member"): kao učesnici tehničkog programa (TPP) ili sa statusom posmatrača.

Konvencija o kontroli i žigosanju predmeta od dragocjenih metala (Hallmarking Convention) ili Bečka konvencija je međunarodni ugovor o prekograničnoj trgovini predmetima od dragocjenih me-

tala, kojim se na teritoriji članica potpisnica Konvencije, postiže slobodno kretanje predmeta od dragocjenih metala označenih zajedničkim kontrolnim žigom (Common Control Mark - CCM). Cilj Konvencije je olakšavanje prekogranične trgovine predmetima od dragocjenih metala, podržavajući istovremeno pravednu trgovinu i zaštitu potrošača.

Predstavnici Zavoda mogu da prisustvuju zasjedanjima Odbora Bečke konvencije, bez prava glasa i mogućnosti primjene zajedničkog kontrolnog žiga. Konvencija redovno organizuje međulaboratorijske šeme testiranja (Round Robin), koje omogućavaju laboratorijama učesnicama da demonstriraju pravilnu primjenu metoda analize. Laboratorija za dragocene metale uspostavljena u okviru Zavoda za metrologiju, početkom oktobra ove godine učestvovala je međulaboratorijskom poređenju u cilju procjene tehničke kompetentnosti za ispitivanje predmeta od zlata i srebra metodom rendgenske spektrometrije.

Unapređenje tehničkih kapaciteta Laboratorije za kontrolu predmeta od dragocjenih metala u narednom periodu se zasniva na instaliranju opreme koja će se isporučiti u okviru projekta "Tehnička podrška za usklađivanje i implementaciju EU zakonodavnog okvira u oblasti unutrašnjeg tržišta - IPA 2014". Potvrđivanje tehničke kompetentnosti i razvoj novih metoda ispitivanja predmeta od dragocjenih metala veoma su važni za proces pristupanja Crne Gore Bečkoj konvenciji, što će omogućiti slobodno kretanje predmeta od dragocjenih metala označenih zajedničkim kontrolnim žigom. Poznato je da potrošači imaju povjerenje u tačan sadržaj dragocjenih metala u proizvodima sa oznakom CCM koje kupuju. U mnogim zemljama nakit se ne smatra samo modnim detaljem, već i investicijom.

Glasnik: Aktivnosti Zavoda za metrologiju su nerijetko orijentisane i prema djeci. Molimo Vas da upoznate naše čitaoc e o čemu je riječ.

V. Asanović: Želeći da doprinesemo razvoju društva zasnovanog na znanju i kreativnosti, u prethodnom periodu smo organizovali brojne aktivnosti. Radionice: "Hemija svuda oko nas" i "Mjerenja oko nas", "Dječiji prolječni vikend", kviz za osnovce: "Zašto su mjerenja važna?", Metrokviz za srednjoškolce sa Cetinja, kao i konkursi "Ljepota kristala", "Foto konkurs", "Mjerioci u kuhinji" i "Maskota po mjeri" samo su dio našeg edukativno-promotivnog programa namijenjenog djeci. U našem fokusu je da djecu zainteresujemo za misteriozni svijet mjerenja, kao i da ih podsjetimo da metrologija, matematika, hemija i fizika mogu da budu zabavne i interesantne. Takmičenja su praćena i dodjelom vrijednih nagrada. U zavisnosti od osvojenih poena, djeci su dodijeljeni tablet računari, bicikla, akcione kamere, polaroid fotoaparati, bežične slušalice, pametni i G shock satovi, fitness narukvice, bluetooth zvučnici, knjige, školski pribor i društvene igre.

Zavod takođe priprema "Zabavnu svesku za male mjerioce" čiji je sadržaj prilagođen uzrastu djece od 4 do 7 godina. Crtanje, bojenje i traženje ispravnog odgovora vode djecu na zabavan način do prvih znanja o tačnim mjerenjima.

Osnovni cilj organizovanja radionice "Hemija svuda oko nas" bio je da se školskoj populaciji približe znanja iz grupe prirodnih nauka (hemija, fizika, matematika). Tokom četiri dana radionice, izvedeni su eksperimenti koji ilustruju povezanost hemije i fizike sa mjerenjima i Periodnim sistemom elemenata (PSE). Učenicima je prikazano kako je razvoj hemije pratio razvoj ljudskog društva, kao i kako je 2015. godine kompletiran novi PSE nakon otkrića još četiri

elementa. Promovisane su i nove definicije Međunarodnog sistema jedinica (SI) za kilogram, amper, kelvin i mol, koje su stupile na snagu 20. maja 2019. godine.

U okviru dvodnevne manifestacije pod nazivom "Dječiji prolječni vikend", Zavod za metrologiju predstavio se najmlađim posjetiocima tržnog centra Delta City. Edukativna radionica osmišljena sa ciljem da djeci na razumljiv način približi i pojašni pojam metrologije i uticaj mjerenja na svakodnevni život, obuhvatila je praktične primjere, interaktivnu igru i asocijacije. Tokom radionice, najmlađi su svoju kreativnost mogli da ispolje i crtežima, kao i samostalnim mjerenjima. Dodijeljeni su im i sertifikati o tačnim vrijednostima njihove mase i visine.

Djeca najmlađeg uzrasta bila je posvećena i radionica pod nazivom "Mjerenja oko nas" koja je u saradnji sa udruženjem "Roditelji" održana u prostorijama Igračkoteke i Razvojnog centra u Podgorici. Mjerenja mase su na zabavan način predstavljena djeci uzrasta od 5 do 10 godina. Prilika da samostalno mjere razne supstance bila je posebno interesantna mališanima.

Zavod za metrologiju je 4. maja 2017. godine, u saradnji sa JU Gimnazija Cetinje i NVO Građanski kreativni centar, organizovao kviz znanja iz metrologije, fizike i hemije pod nazivom "METROKQVIZ" namijenjen učenicima cetinjske Gimnazije. Kviz koji je uslijedio nakon što su gimnazijalci posjetili laboratorije Zavoda, bio je interesantan za publiku i pokazao je da učenici vole nadmetanje u znanju. U okviru projekta "Otvoreni dani nauke" pod pokroviteljstvom Ministarstva nauke, Zavod za metrologiju je 10. oktobra 2018. godine organizovao kviz "Zašto su mjerenja važna?" za učenike osnovnih škola. Provjeru znanja iz matematike i prirodnih nauka, pratila je i promocija redefinicije Međunarodnog sistema jedinica (SI). Kviz je organizovan u prostorijama osnovne škole "21. maj" iz Podgorice.

Foto konkurs je organizovan u periodu od 10. septembra do 10. novembra 2019. godine u cilju podsticanja djece na kreativno razmišljanje. Na foto konkursu je učestvovalo 80 učenika srednjih škola koji su poslali radove na temu: "Najljepše što možemo doživjeti je ono što je tajanstveno. To je suštinski osjećaj koji stoji u osnovi nauke i umjetnosti" – Albert Ajnšajn. Zadatak je bio je da se kroz umjetnički i svojstven doživljaj, na fotografiji prikažu naučni pojmovi i praksa, inovacije, tehnika i tehnologija, naglašavajući važnu ulogu nauke u društvu i njegovom razvoju, kao i značaj i uticaj nauke na svakodnevnicu. Izložba fotografija svih učesnika Foto konkursa, koja je bila postavljena od 17. do 20. decembra 2019. godine u KIC "Budo Tomović" u Podgorici, pokazala je fascinantne domete njihove mašte.

Zavod za metrologiju je u saradnji sa Hrvatskom udrugom kristalografa dva puta organizovao konkurs "Ljepota kristala", odnosno takmičenje u rastu kristala namijenjeno učenicima VII, VIII i IX razreda osnovnih škola, kao i učenicima svih razreda srednjih škola. Cilj takmičenja bio je da učenici prošire teorijska i praktična znanja iz hemije i kristalografije, upoznaju se sa osnovnim tehnikama laboratorijskog rada i metodologijom naučnog istraživanja. Organizovanje takvog konkursa je bilo usmjereno i na podsticanje učenika na samostalan rad i aktivnosti koje proširuju nastavni plan i program.

Zavod za metrologiju je podržao kampanju "Ostani doma" organizovanu na početku proglašenja epidemije u Crnoj Gori u cilju poštovanja mjera i preporuka zvaničnih nadležnih institucija za

očuvanje zdravlja građana. Realizovana su dva kreativna konkursa: "Mjerioci u kuhinji" i "Maskota po mjeri". Željeli smo da podstaknemo djecu da vrijeme koje provode kod kuće ispune zabavnim sadržajem i ujedno da nauče više o mjenjenjima i Međunarodnom sistemu jedinica (SI).

Konkurs "Mjerioci u kuhinji", bio je namijenjen djeci uzrasta do 15 godina. U okviru konkursa, pozvali smo djecu i roditelje da nam pošalju video zapise iz svojih domova koji prikazuju kako na primjer, djeca mjere masu i/ili zapreminu namirnica ili pomažu u pravljenju kolača, palačinki, mafina i sl. Uz zabavu, istovremeno su djeca učila o upotrebi mjernih jedinica kilogram i litar u kuhinji, kao i manjim mjernim jedinicama gram i mililitar. Na konkursu su učestvovala djeca iz Crne Gore i regiona. Svi video zapisi koje su nam poslali mali mjerioci, kuvari i kolačari mogu se pogledati na veb sajtu Zavoda i društvenim mrežama.

U okviru konkursa "Maskota po mjeri", namijenjenog djeci uzrasta do 12 godina, bilo je potrebno da djeca po uzoru na dizajnirane modele maskota za metar, kilogram, sekundu, amper, kelvin, kandelu i mol, izrade svoju verziju izabrane maskote. Konkursom je bila predviđena mogućnost korišćenja raznih likovnih tehnika: crtačke (olovka, tuš, pastel), slikarske (akvarel, tempera, kolaž), kao i vajarske (glina, papir, plastelin, kombinovana tehnika). Mnogo interesantnih radova je upućeno Zavodu za metrologiju, a stručni žiri je odabrao najbolje.

Glasnik: Metrologija je uz standardizaciju, akreditaciju i ocjenjivanje usaglašenosti jedan od stubova infrastrukture kvaliteta. U kojoj mjeri je, prema Vašem mišljenju, kvalitet zaživio kao kultura u Crnoj Gori i koliki je njegov značaj naročito u ovim pretpristupnim uslovima?

V. Asanović: Poznate su nam mnogobrojne definicije kvaliteta, pa čak i to da mnogi smatraju da umjesto definisanja treba tumačiti kvalitet. Danas smo svjesni da nam svakako trebaju i definicije i tumačenja, i implementacije i unapređenja kvaliteta u različitim područjima. Nacionalna infrastruktura kvaliteta se smatra važnom karikom integracije zemlje u međunarodni sistem trgovine. Centar za kvalitet Mašinskog fakulteta, Zavod za metrologiju, Institut za standardizaciju, Akreditaciono tijelo Crne Gore i Privredna komora Crne Gore realizovali su mnogobrojne radionice, okrugle stolove, konferencije u cilju promovisanja značaja kvaliteta za razvoj našeg društva. Sigurno je da nas čeka još mnogo novih inicijativa kako bi privrednici, organizacije, laboratorije, ali i građani razumjeli da su dosljedna primjena standarda, kalibracije uz ostvarenu sljedivost mjerenja, dokazivanje kompetentnosti za sprovođenje postupaka kalibracije i ispitivanja ključni faktori u ostvarivanju potrebnog kvaliteta u industriji, proizvodnji hrane, dijagnostici, liječenju, bezbjednosti i zaštiti životne sredine.

Sloboda kretanja robe se definiše kao jedna od četiri slobode koje garantuju efikasno funkcionisanje unutrašnjeg tržišta Evropske unije. Donošenje i primjena standarda, tačna i pouzdana mjerenja, kao i usklađivanje nacionalnog zakonodavstva sa legislativom Evropske unije usmjereni su na uklanjanje tehničkih barijera trgovini. U okviru Pododbora za trgovinu, industriju, carine i poreze razmatraju se institucionalni i administrativni kapaciteti institucija koje čine infrastrukturu kvaliteta. Ostvaren je značajan napredak od momenta potpisivanja Sporazuma o stabilizaciji i pridruživanju između Evropskih zajednica i njihovih država članica i Crne Gore. Jačanje administrativnih kapaciteta i obezbjeđenje namjenjski izgrađenog poslovnog prostora za Zavod za metrologiju, Insti-

tut za standardizaciju i Akreditaciono tijelo Crne Gore svakako su važni zadaci za naredni period.

Glasnik: Zavod je 2020. obilježio 14 godina od osnivanja. Kako iz ove perspektive vidite razvoj Vaše veoma značajne institucije u tom periodu, uspjehe koje ste postigli i prepreke sa kojima se suočavate?

V. Asanović: Kada smo 2006. godine počeli da reformišemo metrološku infrastrukturu naslijeđenu iz prethodne države bili smo svjesni velike odgovornosti, svakodnevnih izazova i kompleksnosti ciljeva. Entuzijazam, hrabrost, požrtvovanost i timski duh bili su okosnica razvoja Zavoda. Danas, kada posle 14 godina sagledam rezultate rada, znam da nam se neki planovi nisu ostvarili jer nikada, pa ni onda kada imate početne temelje, nije jednostavno izgrađivati novi sistem. Možda naši klijenti u oblasti zakonske metrologije i kontrole predmeta od dragocjenih metala ne prepoznaju značajan iskorak u odnosu na vrijeme kada su ti poslovi bili u domenu Kontrole mjera i dragocjenih metala Podgorica, podružne jedinice Zavoda za mere i dragocene metale iz državne zajednice Srbija i Crna Gora. Ipak, ja ću naglasiti da su pored evidentnog unapređenja tih oblasti, postignuti značajni rezultati rada kojih možda javnost nije svjesna, a odnose na uspostavljanje metrološke sljedivosti u našoj zemlji, kao i utemeljenje nacionalnih kalibracionih laboratorija u kojima se ostvaruju, čuvaju, održavaju i usavršavaju etaloni Crne Gore. Savremena oprema, obučeni stručni kadar i međunarodno prepoznate mjerne sposobnosti iz oblasti metrologije mase, temperature, dužine, pritiska i zapremine omogućavaju našim klijentima da provjere mjerne instrumente i opremu u cilju tačnog mjerenja beba i djece i provjere njihovog razvoja, mjerenja krvnog pritiska i određivanja potrebne terapije, laboratorijskih testiranja, čuvanja hrane na tačno određenim temperaturama, pravilnog skladištenja vakcina u precizno definisanim temperaturnim uslovima, itd.

Hrvatska akreditacijska agencija i Akreditaciono tijelo crne Gore provjeravaju i potvrđuju još od 2014. godine kompetentnost Zavoda za sprovođenje kalibracija prema standardu MEST EN ISO/IEC 17025. Danas je na teritoriji Evrope prepoznata i priznata osposobljenost Zavod za metrologiju za obavljanje kalibracije tegova, tegova slobodnih nazivnih masa i neautomatskih vaga; mjerila zapremine od stakla i mjerila zapremine sa klipom; etalona prelivnih pipeta i mjernih posuda; mjerila temperature i relativne vlažnosti; etalona i mjernih uređaja dužine; etalona i mjerila električnih veličina; frekvencije i vremenskog intervala; mjerila pritiska i mjerila jonizujućeg zračenja.

Objavljivanje 24 najbolje mjerne i kalibracione mogućnosti u bazi podataka Međunarodnog biroa za tegove i mjere (BIPM) i učešće u formiranju Univerzalnog koordinisanog vremena, naš rad čini prepoznatljivim u cijelom svijetu. U metrološkoj zajednici je dobro poznato da se takvi rezultati ne postižu ni lako ni brzo. U našem slučaju, objavljene najbolje mjerne i kalibracione mogućnosti i realizacija formiranja crnogorskog vremena, svakako su rezultati dugogodišnjeg posvećenog rada zaposlenih u laboratorijama Zavoda.

Zavod posjeduje licencu za obavljanje naučno-istraživačke djelatnosti iz oblasti tehničko-tehnoloških i interdisciplinarnih nauka i upisan je u registar inovativnih organizacija, zbog čega je potencijalni partner u skoro svim prioritetima programa bilateralne, prekogranične i transnacionalne saradnje. Izgradili smo i poziciju metrološkog sistema i države Crne Gore u međunarodnim i regi-

onalnim metrološkim organizacijama. Podsjetiti vas da je Zavod punopravni član Evropskog udruženja nacionalnih metroloških instituta (EURAMET) od juna 2011. godine, čemu je prethodilo pridruženo članstvo od 2007. godine. Zavod je dopisni član Međunarodne organizacije za zakonsku metrologiju (OIML) od novembra 2007. godine, a prošle godine je pokrenuta i procedura za sticanje statusa punopravnog člana. Od januara 2009. godine Zavod je bio pridruženi član Evropske kooperacije za zakonsku metrologiju (WELMEC). Promjena organizacione strukture WELMEC-a sprovedena krajem 2019. godine, omogućila je i punopravno članstvo Zavoda u toj međunarodnoj organizaciji. Crna Gora je kao 59. članica primljena u Međunarodni biro za tegove i mjere (BIPM), početkom 2018. godine, u kojem je predstavlja Zavod za metrologiju. Učešće u donošenju odluka bitnih za razvoj metrologije na evropskom i svjetskom nivou, kao i participiranje u međunarodnim projektima kreiraju uslove za izmjenu propisa, formulisanje procedura i planiranje novih ciljeva i dostignuća.

S obzirom da je zajednički okvir procjene (Common Assessment Framework, CAF) prepoznat kao pogodan sistem interne procjene (samoprocjene) za javnu upravu kako na nivou Evropske unije, tako i na nacionalnom, regionalnom i lokalnom nivou, zainteresovali smo se za njegovu primjenu u Zavodu. Samoprocjenom u javnim organizacijama identifikuju se aktivnosti unapređenja i olakšava se učenje na osnovu poređenja sa referentnim vrijednostima (>>bench learning<<) između organizacija javnog sektora. Ciljevi implementacije CAF sistema u institucijama su profesionalizacija javne uprave, uvođenje principa upravljanja ukupnim kvalitetom (TQM) u javnoj upravi, kao i progresivno usmjeravanje ka potpunom ciklusu "planirati-uraditi-provjeriti-sprovoditi". U okviru projekta koji zajednički sprovode Regionalna škola za javnu administraciju (ReSPA) i Centar za istraživanja u oblasti javne uprave (KDZ-Austrija), Zavod za metrologiju je u toku 2019. godine, kao prvi organ državne uprave svoj rad testirao u skladu sa zahtjevima CAF metodologije.

Kompleksnost metrološke djelatnosti zahtijeva kontinuirano unapređenje kadrovskih kapaciteta, koje se sprovodi putem edukacije osoblja u inostranstvu i zemlji u okviru programa koje organizuju regionalne i međunarodne metrološke organizacije, Uprava za kadrove, ReSPA, nacionalni metrološki instituti itd. U toku prvog i četvrtog kvartala trebalo je da se realizuju dva granta za mobilnost istraživača (RMG) odobrena u okviru projekta Precision Time for Industry (17INDI). Razvoj novih tehnologija za distribuciju vremena u industrijske svrhe tema je projekta koji se finansira u sklopu Evropskog istraživačkog i inovativnog programa u oblasti metrologije (EMPIR). Dve mlade predstavnice Zavoda će se uključiti u istraživanja u oblasti primjene White Rabbit (WR) tehnologija za distribuciju vremena, koje sprovode nacionalni metrološki instituti Italije (INRIM), Francuske (LNE-SYRTE), Velike Britanije (NPL), Švedske (RISE) i Holandije (VSL). Nažalost, pojava bolesti Covid-19 u Italiji, prekinula je započeta istraživanja i boravak jedne crnogorske predstavnice u martu ove godine, a za drugu je realizacija granta odložena. Nadam se da će se naredne godine stvoriti uslovi za nastavak planiranih istraživanja i uspješan razvoj kadrovskih kapaciteta Zavoda.

Mnogobrojne obuke u organizaciji EURAMET-a bile su planirane za 2020. godinu u cilju izgradnje kapaciteta za unapređenje prenosa znanja i pripremu za aktivnije učešće u evropskim istraživačkim projektima u oblasti metrologije. Nekoliko obuka je organizovano korišćenjem Zoom i drugih platformi, dok su one koje podrazumi-



jevaju posjetu inostranim laboratorijskim centrima odložene do trenutka stabilizacije zdravstvene situacije.

Osnovne prepreke sa kojim se suočavamo su nedovoljan broj zaposlenih i razvoj Zavoda u zakupljenom prostoru. Mjere ograničavanja zapošljavanja u cilju optimizacije javne uprave uslovile su izmjenu Pravilnika o unutrašnjoj organizaciji i sistematizaciji Zavoda za metrologiju. Svjesna sam da ekonomska kriza diktira promjenu politike zapošljavanja, ali ne smijemo zaboraviti da je jačanje kadrovskih kapaciteta Zavoda u narednom periodu neophodno za održavanje usaglašenosti sa tehničkim propisima i evropskom metrologijom u skladu sa članom 77 Sporazuma o stabilizaciji i pridruživanju između Evropskih zajednica i njihovih članica sa jedne strane i Crne Gore.

Iako smo relevantnim institucijama često slali dopise i materijale u kojim su detaljno opisane prostorije potrebne za razvoj laboratorija i smještaj zaposlenih, kao i precizirani faktori koji utiču na rezultate mjerenja, nismo uspjeli da dobijemo namjenski izgrađenu zgradu. Laboratorijske kapacitete morali smo da projektujemo u iznajmljenom poslovnom prostoru jer uspostavljanje jedinstvenog sistema mjerenja nije dozvoljavalo pasivno čekanje rješenja situacije. Preseljanje laboratorijskog centra na novu adresu u julu prošle godine bio je pravi poduhvat. Kratak rok za sprovođenje svih planiranih faza preseljenja, projektovanja laboratorijskih prostorija, demontaže etalonske i mjerne opreme, transporta i montaže na novoj lokaciji, uspostavljanja potrebnih ambijentalnih uslova za čuvanje, održavanje i usavršavanje etalona Crne Gore, kao i organizovanje svih radnih jedinica u novim uslovima, bio je dodatni izazov za menadžment i zaposlene u Zavodu za metrologiju. Saradnja sa inostranim firmama specijalizovanim za demontažu i montažu sofisticirane metrološke opreme, podrška Ministarstva finansija, kao timski rad zaposlenih iz Zavoda rezultirali su novim uspješnim početkom ili bolje reći novom etapom razvoja mjernog sistema u Crnoj Gori.

Promjena poslovnih prostorija onemogućila je pružanje usluga kalibracije mjerila/etalona iz akreditovanog područja zbog čega su naši klijenti bili primorani da u drugoj polovini 2019. godine, ostvare svoje zahtjeve van Crne Gore. Poslovi u oblasti zakonske metrologije su se realizovali u kontinuitetu. Nakon ponovnog uspostavljanja nacionalnih kalibracionih laboratorija, korigovanja sistema za klimatizaciju i ventilaciju, inoviranja poslovnih proce-

dura i organizovanja mjerenja u novim uslovima, na osnovu sprovedenih provjera, kao što je i očekivano Hrvatska akreditacijska agencija i Akreditaciono tijelo Crne Gore su u januaru 2020. godine obavijestili Zavod o vraćenom statusu akreditacije i mogućnosti postavljanja znaka akreditacije na svim uvjerenjima o kalibraciji koje izdaje Zavod za metrologiju.

Glasnik: Koji su planovi Zavoda za metrologiju u predstojećem periodu?

V. Asanović: William Adelbert Foster prije mnogo godina rekao je: "Kvalitet nikada nije slučajnost; on je uvijek rezultat visokih ciljeva, iskrenog nastojanja, pametnog usmjeravanja i vještog sprovođenja. Kvalitet znači mudar izbor među mnogim mogućnostima." Razmatranjem mogućnosti i potreba ekonomije naše države, ali i ciljeva njenog pristupanja Evropskoj uniji, planiramo naše aktivnosti u narednom periodu. Za Vaše čitaoce će možda biti interesantno unapređenje usluga u oblasti zakonske metrologije, uspostavljanje integrisanog sistema menadžmenta kvalitetom, digitalna transformacija i razvoj e-learning platforme.

Budući da zakonski kontrolisana mjerila treba da garantuju korektnu rezultate mjerenja u radnim uslovima, u toku upotrebe mjerila i u okviru zadatih dopuštenih grešaka, jedan od primarnih zadataka za naredni period je poboljšanje kvaliteta usluga u oblasti zakonske metrologije. Unapređivaćemo postupke ocjenjivanja usaglašenosti zakonskih mjerila sa metrološkim zahtjevima. U prvoj fazi ćemo poboljšati procedure ovjeravanja nepomičnih rezervoara, mjerila protekle zapremine i mjernih sistema za tečnosti koje nisu voda. Uspostavićemo i nove metode ispitivanja količina prethodno upakovanih proizvoda.

Zavod je strateški opredijeljen da rad i usluge koje pruža klijentima unapređuje kroz implementaciju standarda kvaliteta. Pokrenuli smo postupak revizije postojećih i izradu novih internih procedura rada na nivou svih organizacionih jedinica Zavoda. Revizija obuhvata usklađivanje radnih procesa u Zavodu sa Zakonom o upravljanju i unutrašnjim kontrolama u javnom sektoru, Zakonom o sprječavanju korupcije i pratećim podzakonskim aktima, kao i zahtjevima standarda MEST EN ISO/IEC 17025:2018; MEST EN ISO 9001:2016; MEST EN ISO/IEC 17020:2013; MEST ISO 31000:2018; MEST ISO 45001:2018; MEST EN ISO/IEC 27001:2019 i MEST EN ISO/IEC 17043:2017. Osim toga, planirana je i sertifikacija sistema me-



nadžmenta kvalitetom prema standardu MEST EN ISO 9001:2016, odnosno uspostavljanje integrisanog sistema menadžmenta kvalitetom u Zavodu za metrologiju.

Digitalna transformacija privrede i društva je imperativ današnjeg doba. Proširenje tržišta i ekonomski rast u budućnosti se u Evropskoj uniji povezuju sa primjenom novih tehnologija za razvoj proizvoda i usluga, kao što su Internet of Things, Big Data, robotika, 3D štampa, blockchain i vještačka inteligencija. Uspješna digitalna transformacija zavisi u velikoj mjeri od razvoja metrologije, budući da njenu osnovu čine vrijednosti dobijene mjerenjima, podaci, algoritmi, matematički i statistički postupci, kao i komunikacione arhitekture. Imajući u vidu evropske metrološke izazove, jedan od glavnih prioriteta Zavoda za metrologiju predstavlja unapređenje kvaliteta usluga u cilju podrške razvoju digitalnog društva, kao i digitalizaciji javnog sektora u Crnoj Gori. Industrijska metrologija u budućnosti oslanjaće se na međunarodno priznate, mašinski čitljive digitalne sertifikate sa odgovarajućom infrastrukturom za uzajamno priznavanje validnosti. Zavod za metrologiju se kao partner u toku 2019. godine, pridružio projektu EURAMET TC-IM 1448: "Razvoj digitalnih kalibracionih sertifikata". Ovaj značajni projekat Evropskog udruženja nacionalnih metroloških inistituta podstiče razvoj digitalnih kalibracionih sertifikata koji će služiti za elektronsko skladištenje, autentifikaciju, šifrovanje i potpisivanje, kao i uniformnu interpretaciju rezultata kalibracije.

Započeli smo razvoj e-learning platforme koja će obezbijediti pristupačan, zanimljiv i interaktivan način za sticanje novih znanja iz oblasti metrologije. Prva faza razvoja e-learning platforme je usmjerena na interni prenos znanja. Dakle, kreiraju se kursevi različitih nivoa i provjere znanja metrologa iz Zavoda. Potom ćemo u okviru druge faze razvoja e-learning platforme, dizajnirati kurseve za korisnike naših usluga, metrološku inspekciju, javnu upravu i sve zainteresovane kojima je metrologija u fokusu djelovanja. Treća faza razvoja odnosi se na prilagođavanje platforme učenicima osnovnih i srednjih škola u cilju jačanja njihove buduće profesionalne orijentacije ka nauci.

Glasnik: Ukoliko postoji tema koja nije obuhvaćena pitanjima, a važna je za naše čitaoce, molimo da dodate.

V. Asanović: Svjesni opasnosti od prenosa bolesti Covid-19, ali i neophodnosti održavanja poslovanja svih subjekata u Crnoj Gori, zaposleni u Zavodu za metrologiju stručno, etički, pouzdano i u predviđenim rokovima realizuju zahtjeve klijenata. Podsjećam naše klijente da zahtjeve za usluge Zavoda mogu da dostave preko portala eUprava, a da se sve informacije o našem radu prezentuju na našem veb sajtu i društvenim mrežama.

U Zavodu se mogu organizovati stručne prakse za učenike srednjih škola koji se obrazuju za tehnička zanimanja u elektro, mašinskoj i metalurškoj struci, kao i onih koji će se baviti izradom ili nekim vidom kontrole predmeta od dragocjenih metala. Prakse za studente tehničkih i društvenih fakulteta, kao i mogućnost volonterskog rada u Zavodu samo su neki od razloga da se mladi zainteresuju za nauku o mjerenjima, koja će ih zaintrigirati istorijskim razvojem, ali i ulogom u razvoju vještačke inteligencije i biotehnologije.

Stišavanje epidemije, povratak djece u školske klupe i normalizacija radnih uslova omogućiće organizovanje naše tradicionalne manifestacije "Otvoreni dani". Zavod će otvoriti vrata laboratorija i učenicima osnovnih i srednjih škola prikazati državne etalone i opremu koja čini osnovu metrološkog sistema naše zemlje.



Dr. Vanja Asanović, director of the Bureau of Metrology

Significant results in establishing metrological traceability

Glasnik: To what extent did the pandemic Covid-19 affect the operations of the Bureau of Metrology of Montenegro? What are the most important activities that you have carried out during this period? Could you share with our readers some details about them?

V. Asanović: The Covid-19 pandemic, which has suddenly changed the lives of people around the globe, also caused a change in the dynamics of the activities of the Bureau of Metrology. Following the occurrence of the first cases of coronavirus infection in Montenegro, the Bureau introduced measures to prevent the transmission of infectious diseases in accordance with the decisions of the Government of Montenegro, the Ministry of Health, the Institute for Public Health and the National Coordination Body for Infectious Diseases. In order to reduce the risk of virus transmission among the employees, as well as to protect persons, who are at higher risk of developing complications, client requirements were realized in a reduced capacity until the second half of May 2020.

The improvement of the epidemiological situation in Montenegro, followed by defining the approach which assumes that the economy and society as a whole have to be able to continue functioning under new circumstances, was reflected on the activities of the Bureau as well.

The regular working regime has been renewed regarding the implementation of procedures for verification of legal measuring instruments in the official premises of the Bureau and on the terri-

tory of Montenegro, calibration of measuring instruments/etalons, as well as inspection and marking items of precious metal. A special attention was paid to the application of measures to prevent the transmission of new coronavirus, so that protective masks, visors, measuring body temperature when entering the official premises of the Bureau, respecting the physical distance of at least two meters and limiting the number of clients who can stay in front of the counter became unavoidable companions of our work. Verification of legal measuring instruments in foreign laboratories has been difficult, and in some cases impossible, due to unfavourable epidemiological circumstances not only in Montenegro, but in Europe as well.

However, in cooperation with our clients, we have found the best solutions for complicated requirements in order to avoid slowing down the important development projects in Montenegro. Analyzing our activities in the period from March 16 to October 15 this year and comparing these data with the average values for the same period of the previous four years, led us to the conclusion that the number of clients' requests is lower by about 20%, which affected the reduction of charged fees in the field of metrology and precious metals by about 25%. Given the impact of the Covid-19 pandemic on economic branches, it is not surprising that there are fewer requests for verification of taximeters, as well as the inspection and marking of precious metal items.



The Covid-19 disease pandemic caused the postponement of workshops aimed at presenting new definitions of units of the International System of Units (SI system) to educators, as well as to the representatives of the state administration bodies whose activities relate to creating curricula and writing textbooks. The workshops dedicated to promoting the best measurement and calibration capabilities of the Bureau of Metrology, as well as presenting the legal framework governing the field of verification of various measuring instruments in Montenegro, have also been postponed. New business conditions during the Covid-19 pandemic impose the need for online presentation of educational and promotional contents.

Glasnik: You have set up new laboratories. How will they contribute to the work of the Bureau and its clients?

V. Asanović: We are continuously improving our work procedures and expanding the scope of accreditation. The Laboratory for Ionizing Radiation, which stores and maintains radioactive radiation sources and develops calibration and measurement methods for determining the concentration of radon in the air, is a new segment of the accreditation area of the Bureau of Metrology. The equipment for the development of the Ionizing Radiation Laboratory was donated by the International Atomic Energy Agency (IAEA) at the end of 2017 as part of the MNE9004 project: "Upgrading the national system for radon protection".

Since the radioactive gas radon is recognized as a cause of lung cancer, it is very important to have reliable information about its concentration in school and business premises, as well as in residential buildings. The accuracy of the instruments and the traceability of the measurements directly affect the reliability of the data obtained through the measurement.

The establishment of the Laboratory for Ionizing Radiation within the Bureau has created conditions for the calibration of instruments used to measure the concentration of radon in the air both in Montenegro and in the region.

The improvement of legal metrology in Montenegro is reflected in the establishment of the Laboratory for verification of evidential breathalysing machine (EBM), Laboratory for verification of phonometers and Laboratory for verification of exhaust gas analyzers. Evidential breathalysing machines as the legal measuring instruments are used in the field of traffic safety, and are, like phonometers, intended for protection of property, environment, natural resources, protection at work and protection against accidents. Installation of the equipment within the Bureau of Metrology and training of professional staff were a prerequisite for the organization of verification of EBM and phonometers in Montenegro, instead in foreign laboratories, which is very important for our clients especially from an economic point of view.

Exhaust gas analyzer is a measuring instrument used to determine the volume share of certain components (CO, CO₂, O₂ and hydrocarbons) of vehicle engine exhaust gas. In order to improve the procedures for conformity assessment of these measuring instruments with the prescribed metrological requirements, which are used in the stations for technical inspection of motor vehicles, the necessary equipment was provided and training of employees in the Bureau of Metrology was conducted. In the following period, the cooperation with the competent inspection bodies will be intensified, in order to carry out the verification procedures of the exhaust gas analyzer in line with the prescribed norms.

Glasnik: In October, the Bureau of Metrology of Montenegro was awarded the observer status within the Vienna Convention, i.e. the International Agreement on Cross-Border Trade in Precious Metal Objects. Would you please share more details about its importance?

V. Asanović: The Bureau of Metrology conducts professional and related administrative tasks in the field of control of precious metals in Montenegro. The membership in the International Association of Analytical Services (IAAO), which dated back to 2012, was cancelled by the termination of the work of that association on December 31, 2019. At a recent session of the Vienna Convention, it was concluded that most former members of the IAAO have been successfully integrated into the Convention, where they have been granted non-member status: as the technical program participants (TPP) or as observers.

The Convention on the Control and Marking of Items of Precious Metals (Hallmarking Convention) or the Vienna Convention is an international treaty on cross-border trade in precious metals, which allows the free movement of precious metal objects designated with a common control mark (CCM) in the territory of signatories of the Convention. The aim of the Convention is to facilitate cross-border trade in precious metal items, while supporting fair trade and consumer protection.

The representatives of the Bureau may attend the meetings of

the Vienna Convention Board, without the right to vote and the possibility of applying a common control mark. The Convention regularly organizes interlaboratory testing schemes (Round Robin), which allow the participating laboratories to demonstrate the proper application of methods of analysis. The Laboratory for Precious Metals, established within the Bureau of Metrology, at the beginning of October this year participated in an interlaboratory comparison in order to assess the technical competence for testing gold and silver items by X-ray spectrometry method.

Improving the technical capacities of the Laboratory for Control of Precious Metals in the coming period is based on the installation of the equipment, which will be delivered within the project "Technical Assistance for Harmonization and Implementation of the EU Legislative Framework in the Field of Internal Market - IPA 2014". Validation of technical competence and development of new methods of testing precious metal objects are very important for the process of Montenegro's integration in the Vienna Convention, which will enable the free movement of precious metal items designated with a common control mark. Consumers are known to have confidence in the exact contents of precious metals in CCM-labeled products they buy. In many countries, jewellery is considered not only a fashion detail, but also an investment.

Glasnik: The activities of the Bureau of Metrology are often oriented towards children. Would you please present these activities to our readers?

V. Asanović: We wanted to contribute to the development of a society based on knowledge and creativity, so we organized numerous activities in the previous period. Workshops: "Chemistry all around us" and "Measurements around us", "Children spring weekend", quiz for elementary school pupils: "Why are measurements important?", Metro quiz for high school students from Cetinje, as well as competitions "Beauty of Crystals", "Photo competition", "Measurers in the kitchen" and "Custom-made mascot" are just part of our educational and promotional program intended for children. Our focus is to get children interested in the mysterious world of measurement, as well as to remind them that metrology, maths, chemistry and physics can be fun and interesting. Moreover, valuable prizes were awarded at the competitions. Depending on the points won, children were awarded with tablets, computers, bicycles, action cameras, Polaroid cameras, wireless headphones, smart and G shock watches, fitness armbands, bluetooth speakers, books, school supplies and board games.

The Bureau is also preparing a "Fun notebook for young measurers", the contents of which is adapted to children aged from 4 to 7. Drawing, colouring and searching for the right answer lead children in a fun way to the first knowledge of accurate measurements.

The main goal of organizing the workshop "Chemistry all around us" was to bring the knowledge from the group of natural sciences (chemistry, physics, mathematics) closer to the school population. During the four-day workshop, experiments were performed to illustrate the connection between chemistry and physics with measurements and the Periodic System of the Elements (PSE). It was presented to the pupils how the development of chemistry followed the development of human society, as well as how the new PSE was completed in 2015 after the discovery of four more elements. New definitions of the International System of Units (SI) for kilogram, ampere, kelvin and mole, which came into force on

May 20, 2019, were also promoted.

Within a two-day event called "Children Spring Weekend", the Bureau of Metrology introduced itself to the youngest visitors of the Delta City shopping center. The educational workshop, designed to bring the concept of metrology and the impact of measurement on everyday life closer to the children in an understandable way, included practical examples, interactive play and associations. During the workshop, the youngest could express their creativity with drawings, as well as with independent measurements. They were also awarded with certificates of their exact weight and height values.

A workshop called "Measurements around us", dedicated to the youngest, was held in cooperation with the association called "Roditelji" in the premises of the Toy Center and Development Center in Podgorica. Mass measurements were presented in a fun way to children aged 5 to 10 years. The opportunity to measure various substances on their own was especially interesting for children.

On May 4, 2017, the Bureau of Metrology, in cooperation with the PI High School Cetinje and the NGO Civic Creative Center, organized a quiz of knowledge in metrology, physics and chemistry called "METROQUIZ" intended for students of the Cetinje High School. The quiz was organized after the high school students visited the laboratories of the Bureau and it was interesting for the audience and showed that the students like knowledge-based competitions.

As part of the "Open Science Days" project, under the auspices of the Ministry of Science, on October 10, 2018, the Bureau of Metrology organized a quiz "Why are measurements important?" for primary school students. The test of knowledge in mathematics and natural sciences was accompanied by the promotion of the redefinition of the International System of Units (SI). The quiz was organized in the premises of the Elementary School "21. Maj" from Podgorica.

The photo competition was organized in the period from September 10 to November 10, 2019, in order to encourage children to creative thinking. The photo competition involved 80 high school students, who sent their works on the topic: "The most beautiful thing we can experience is the mysterious. It is the source of all true art and science". - Albert Einstein. The task was to show scientific concepts and practice, innovations, techniques and technology in a photography through artistic and characteristic experience, emphasizing the important role of science in society and its development, as well as the importance and influence of science on everyday life. The exhibition of photographs of all participants in the Photo Competition, which was set up in the period December 17-20, 2019 at the KIC "Budo Tomović" in Podgorica, showed the fascinating achievements of their imagination.

The Bureau of Metrology, in cooperation with the Croatian Association of Crystallographers, has organized twice the competition "Beauty of Crystals", i.e. a competition in crystal development intended for pupils of primary school grades VII, VIII and IX, including students of all secondary school grades. The aim of the competition was to expand theoretical and practical knowledge of students in chemistry and crystallography, to be informed about the basic techniques of laboratory work and the methodology of scientific research. The organization of such a competition was also aimed at encouraging independent work of students and extracurricular activities.

The Bureau of Metrology supported the "Stay at Home" campaign

organized at the beginning of the declaration of the epidemic in Montenegro in order to respect the measures and recommendations of the official competent institutions for the preservation of citizens' health. Two creative competitions were realized: "Measurers in the kitchen" and "Custom-made mascot". We wanted to encourage children to fill the day at home with the entertaining contents and at the same time to make them learn more about measurements and the International System of Units (SI).

The competition "Measurers in the kitchen" was intended for children up to the age of 15. As part of the competition, we invited children and parents to send us videos shot taken at their homes showing how, for example, children measure the mass and/or volume of food or help making cakes, pancakes, muffins and the like. Besides they were having fun, at the same time the children learned about the use of measurement units in the kitchen such as kilo and litre, as well as the smaller measurement units such as gram and millilitre. Children from Montenegro and the region participated in the competition. All videos sent to us by small measurers, cooks and pastry chefs can be found on the Bureau's website and social networks.

As part of the "Custom-made Mascot" competition, intended for children under the age of 12, it was necessary for children to make their own version of the chosen mascot based on the designed models of mascots for meter, kilogram, second, ampere, kelvin, candela and mole. The competition provided for the possibility of using various art techniques: drawing (pencil, ink, pastel), painting (watercolour, tempera, collage), as well as sculpture (clay, paper, modelling clay, combined technique). Many interesting works were sent to the Bureau of Metrology, and the professional jury chose the best ones.

Glasnik: Metrology is one of the pillars of the quality infrastructure, along with standardization, accreditation and conformity assessment. To what extent, in your opinion, has the quality been developed as a culture in Montenegro and how important is it, especially in these pre-accession conditions?

V. Asanović: Many definitions of quality have been known, even the fact that many people believe that instead of defining, quality should be interpreted. Today we are aware that we certainly need both definitions and interpretations, including the implementation and quality improvements in various areas. The national quality infrastructure is considered an important link in the country's integration into the international trade system. The Center for Quality of the Faculty of Mechanical Engineering, the Bureau of Metrology, the Institute for Standardization, the Accreditation Body of Montenegro and the Chamber of Economy of Montenegro have realized numerous workshops, round tables, conferences to promote the importance of quality for the development of our society.

It is certain that many new initiatives are ahead of us, so that business community, organizations, laboratories, but also citizens could understand that consistent application of standards, calibration with the achieved traceability of measurement, proving competence for conducting calibration procedures and testing are key factors in achieving the required quality in industry, food production, diagnostics, medical treatment, safety and environmental protection.

Free movement of goods is defined as one of four freedoms that guarantee the efficient functioning of the European Union's inter-

nal market. Adoption and application of standards, accurate and reliable measurements, as well as harmonization of the national with European Union legislation are aimed at removing technical barriers to trade. The Subcommittee on Trade, Industry, Customs and Taxes considers the institutional and administrative capacities of the institutions which make up the quality infrastructure. Significant progress has been made since the signing of the Stabilization and Association Agreement between the European Communities and their Member States and Montenegro. Strengthening the administrative capacities and building the office space intended for the Bureau of Metrology, the Standardization Institute and the Accreditation Body of Montenegro are certainly important tasks for the upcoming period.

Glasnik: In 2020, the Bureau has marked 14 years since its establishment. From this perspective how do you perceive the development of your very important institution, the successes you have achieved and the obstacles you have been facing?

V. Asanović: In 2006, when we started reforming the metrological infrastructure inherited from the previous state, we were aware of the great responsibility, everyday challenges and the complexity of goals. Enthusiasm, courage, dedication and team spirit were the backbone of the development of the Bureau. Today, when I look at the results of our work after 14 years, I know that some of our plans haven't been realized, because it is never easy to build a new system, even when you have the initial foundations. Perhaps our clients in the field of legal metrology and control of precious metals do not recognize a significant progress, compared to the time when these activities were under the Control of Measures and Precious Metals Podgorica, a regional unit of the Bureau for Measures and Precious Metals of the state union of Serbia and Montenegro. However, I will emphasize that in addition to the evident improvement of these areas, significant results have been achieved, which the public may not be aware of, referring to the establishment of metrological traceability in our country, as well as the establishment of national calibration laboratories, in which the standards of Montenegro are realized, stored, maintained and improved. Modern equipment, trained professional staff and internationally recognized measuring capabilities in the field of metrology of mass, temperature, length, pressure and volume allow our clients to check measuring instruments and equipment in order to accurately measure babies and children and check their development, measure blood pressure and determine the necessary therapy, conduct laboratory testing, food storage at precisely defined temperatures, proper storage of vaccines in precisely defined temperature conditions, etc.

Since 2014 the Croatian Accreditation Agency and the Accreditation Body of Montenegro have been checking and confirming the competence of the Institute for Calibration according to the MEST EN ISO/IEC 17025 standard.

Today, on the territory of Europe, the Bureau of Metrology has been recognized and acknowledged for performing calibration of weights, weights of free nominal masses and non-automatic scales; glass volumetric instruments and piston operated volumetric instruments; etalons of overflow pipettes and measuring vessels; temperature and relative humidity measuring instruments; standards and length measuring devices; standards and measuring instruments of electrical quantities; frequency and time interval; pressure and ionizing radiation measuring instruments.

Publishing 24 best measurement and calibration capabilities in the database of the International Bureau of Weights and Measures (BIPM) and participating in the formation of Universal Coordinated Time make our work recognizable worldwide. It is well known in the metrological community that such results are not achieved easily or quickly. In our case, the published measurement and calibration capabilities and the realization of the formation of the Montenegrin time are certainly the results of multiannual dedicated work of employees in the laboratories of the Bureau.

The Bureau has a license to perform scientific and research activities in the field of technical-technological and interdisciplinary sciences and it is registered in the Registry of Innovation Organizations, which is why it is a potential partner in almost all priorities of bilateral, cross-border and transnational cooperation programs. We have also built the reputation of the metrological system and the state of Montenegro in the international and regional metrological organizations. I will remind you that the Bureau has been a full member of the European Association of National Metrology Institutes (EURAMET) since June 2011, which was preceded by associate membership since 2007.

The Bureau has been a corresponding member of the International Organization of Legal Metrology (OIML) since November 2007, and last year a procedure for acquiring the status of a full member was launched. Since January 2009, the Bureau has been an associate member of the European Cooperation for Legal Metrology (WELMEC). The change in the organizational structure of WELMEC, implemented at the end of 2019, provided the full membership of the Institute in that international organization. As the 59th member, Montenegro was admitted to the International Bureau of Weights and Measures (BIPM) at the beginning of 2018, where it is represented by the Bureau of Metrology. Participation in making decisions important for the development of metrology at the European and world level, as well as participation in international projects create conditions for amending regulations, formulating procedures and planning new goals and achievements.

Given that the Common Assessment Framework (CAF) is recognized as a suitable system of internal (self)assessment for the public administration at the level of the European Union as well as at the national, regional and local levels, we are interested in its application in the Bureau. Self-assessment in the public organizations help identifying improvement activities and facilitating benchmarking between the public sector organizations.

The goals of the implementation of the CAF system in the institutions are the professionalization of public administration, the introduction of the principles of total quality management (TQM) in the public administration, as well as progressive orientation towards the "plan-do-check-implement" full cycle. Within the project jointly implemented by the Regional School of Public Administration (ReSPA) and the Center for Research in the Field of Public Administration (KDZ-Austria), in 2019, the Bureau of Metrology, as the first state administration body, tested its work in accordance with the requirements of the CAF methodology.

The complexity of metrological activities requires continuous improvement of personnel capacities, which is carried out through education of staff abroad and in the country within programs organized by the regional and international metrological organizations, the Human Resources Administration, ReSPA, national metrological institutes, etc. During the first and fourth quarters, two Research

Mobility Grants (RMG) approved under the Precision Time for Industry project (17IND1) should be implemented. The development of new technologies for the distribution of time for industrial purposes is the topic of the project funded under the European Research and Innovation Program in the field of metrology (EMPIR).

Two young representatives of the Bureau will be involved in research in the field of application of White Rabbit (WR) technologies for time distribution, conducted by the national metrological institutes of Italy (INRIM), France (LNE-SYRTE), Great Britain (NPL), Sweden (RISE) and the Netherlands (VSL). Unfortunately, the outbreak of the Covid-19 disease in Italy interrupted the started research and the stay of a Montenegrin representative in March this year, while for another one the realization of the grant was postponed. I hope that next year conditions will be created for the continuation of the planned research and the successful development of the personnel capacities of the Bureau.

Numerous trainings organized by EURAMET were planned for 2020 in order to build capacities to improve the knowledge transfer and prepare for more active participation in European research projects in the field of metrology. Several trainings were organized using Zoom and other platforms, while those which assumed visits to foreign laboratory centers were postponed until the health situation is stabilized.

The main obstacles we are facing are the insufficient number of employees and the development of the Bureau in the rented premises. Employment restriction measures aimed at optimization of the public administration caused the amendments to the Rulebook on the internal organization and systematization of the Bureau of Metrology. I am aware that the economic crisis dictates a change in the employment policy, but we must not forget that strengthening the personnel capacity of the Bureau in the coming period is necessary in order to maintain compliance with technical regulations and European metrology according to the Article 77 of the Stabilization and Association Agreement between the European Communities and their members on one side and Montenegro on the other.

Although we have often sent letters and materials to the relevant institutions with a detailed description of the premises needed for laboratory development and the staff accommodation, as well as precise factors affecting the measurement results, we didn't get a building adjusted to our purposes. We had to design the laboratory capacities in the rented business space, because the establishment of a unique measurement system did not allow passive waiting for the situation to be resolved. Moving the laboratory centre to a new address in July last year was a real venture. Short deadline for implementation of all planned phases of relocation, design of laboratory premises, dismantling of standard and measuring equipment, transport and installation at the new location, establishment of necessary environment conditions for storage, maintenance and improvement of Montenegrin standards, as well as organizing all work units in the new conditions, was an additional challenge for the management and the employees of the Bureau of Metrology. The cooperation with foreign companies specialized in dismantling and installation of the sophisticated metrological equipment, support of the Ministry of Finance, as well as a team work of the employees from the Bureau resulted in a new successful start or better said a new stage of development of the measurement system in Montenegro.

The change of business premises made it impossible to provide services of measuring instruments/etalon calibration from the accredited area, which is why our clients were forced to meet their requirements beyond Montenegro in the second half of 2019. The activities in the field of legal metrology were realized continuously. After the re-establishment of national calibration laboratories, correction of the air conditioning and ventilation systems, innovation of business procedures and organization of measurements in new conditions, based on the conducted inspections, as expected, in January 2020 the Croatian Accreditation Agency and the Accreditation Body of Montenegro informed the Bureau about the returned status of accreditation and the possibility of putting the accreditation mark on all calibration certificates issued by the Bureau of Metrology.

Glasnik: What are the plans of the Bureau of Metrology for the upcoming period?

V. Asanović: William Adelbert Foster said many years ago: "Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution; it represents the wise choice of many alternatives". By considering the possibilities and needs of our country's economy, but also the goals of its accession to the European Union, we plan our activities for the upcoming period. Your readers may be interested in improving services in the field of legal metrology, establishing an integrated quality management system, digital transformation and developing an e-learning platform. Since legally controlled measuring instruments should guarantee correct measurement results in working conditions, during the use of measuring instruments and within the given permissible errors, one of the primary tasks for the coming period is to improve the quality of services in the field of legal metrology. We will improve the procedures of conformity assessment of legal standards with metrological requirements.

In the first phase, we will improve the procedures for verification of fixed tanks, volume flow meters and measuring systems for non-water liquids. We will also establish new methods for testing the quantities of pre-packaged products.

The Bureau is strategically committed to improving the work and services provided to clients through the implementation of quality standards. We have initiated the procedure of revision of the existing and development of new internal work procedures at the level of all organizational units of the Bureau. The audit includes harmonization of work processes in the Bureau with the Law on Management and Internal Controls in the Public Sector, the Law on Prevention of Corruption and accompanying bylaws, as well as the requirements of the following standards: MEST EN ISO/IEC 17025:2018; MEST EN ISO 9001:2016; MEST EN ISO/IEC 17020:2013; MEST ISO 31000:2018; MEST ISO 45001:2018; MEST EN ISO/IEC 27001:2019 and MEST EN ISO/IEC 17043:2017. In addition, it is planned to certify the quality management system according to the MEST EN ISO 9001:2016 standard, i.e. the establishment of an integrated quality management system in the Bureau of Metrology.

Nowadays, digital transformation of the economy and society is an imperative. In the European Union market expansion and economic growth in the future are associated with the application of new technologies for the development of products and services, such as the Internet of Things, Big Data, robotics, 3D printing, blockchain and artificial intelligence. Successful digital transformation greatly depends on the development of metrology, as it

is based on values obtained by measurements, data, algorithms, mathematical and statistical procedures, as well as communication architectures. Having in mind the European metrological challenges, one of the main priorities of the Bureau of Metrology is to improve the quality of services in order to support the development of the digital society, as well as the digitalization of the public sector in Montenegro.

Industrial metrology in the future will rely on the internationally recognized, machine-readable digital certificates with appropriate infrastructure for mutual recognition of validity. The Bureau of Metrology, as a partner in 2019, joined the project EURAMET TC-IM 1448: "Development of digital calibration certificates". This important project of the European Association of National Metrology Institutes encourages the development of digital calibration certificates which will be used for electronic storage, authentication, encryption and signing, as well as the uniform interpretation of calibration results.

We have started the development of an e-learning platform, which will provide an accessible, interesting and interactive way to acquire new knowledge in the field of metrology. The first phase of the development of the e-learning platform is focused on the internal knowledge transfer. Therefore, there will be different level courses and testing of knowledge of the metrologists from the Bureau. Then, within the second phase of the development of the e-learning platform, we will create courses for users of our services, metrological inspection, public administration and all those interested in metrology. The third phase of development refers to the adaptation of the platform to primary and secondary school students in order to strengthen their future professional orientation towards science.

Glasnik: If there is anything of importance for our readers that we haven't covered by our questions, please be free to add?

V. Asanović: Aware of the treats of transmission of Covid-19 disease, but also the necessity of maintaining the business of all entities in Montenegro, the employees of the Bureau of Metrology professionally, ethically, reliably and within the deadlines meet clients' requirements. I would like to remind our clients that they can submit the requests to ask for Bureau's services through the eGovernment portal, and that all information about our work is available on our website and social networks.

The Bureau can organize professional internships for high school students, who are educated for technical occupations in the electrical, mechanical and metallurgical professions, as well as those who will deal with the manufacturing or some kind of control of precious metal objects. Internships for students of technical and social faculties, as well as the possibility of volunteer work at the Bureau are just some of the reasons to arise an interest of young people for the science of measurement, which will intrigue them with its historical development, but also with its role in the development of artificial intelligence and biotechnology.

Bringing the epidemic under control, the return of children to school and the normalization of working conditions will enable the organization of our traditional manifestation "Open Days". The Bureau will open the doors of the laboratories and show elementary and high school students the state standards and equipment, which form the basis of the metrological system of our country.