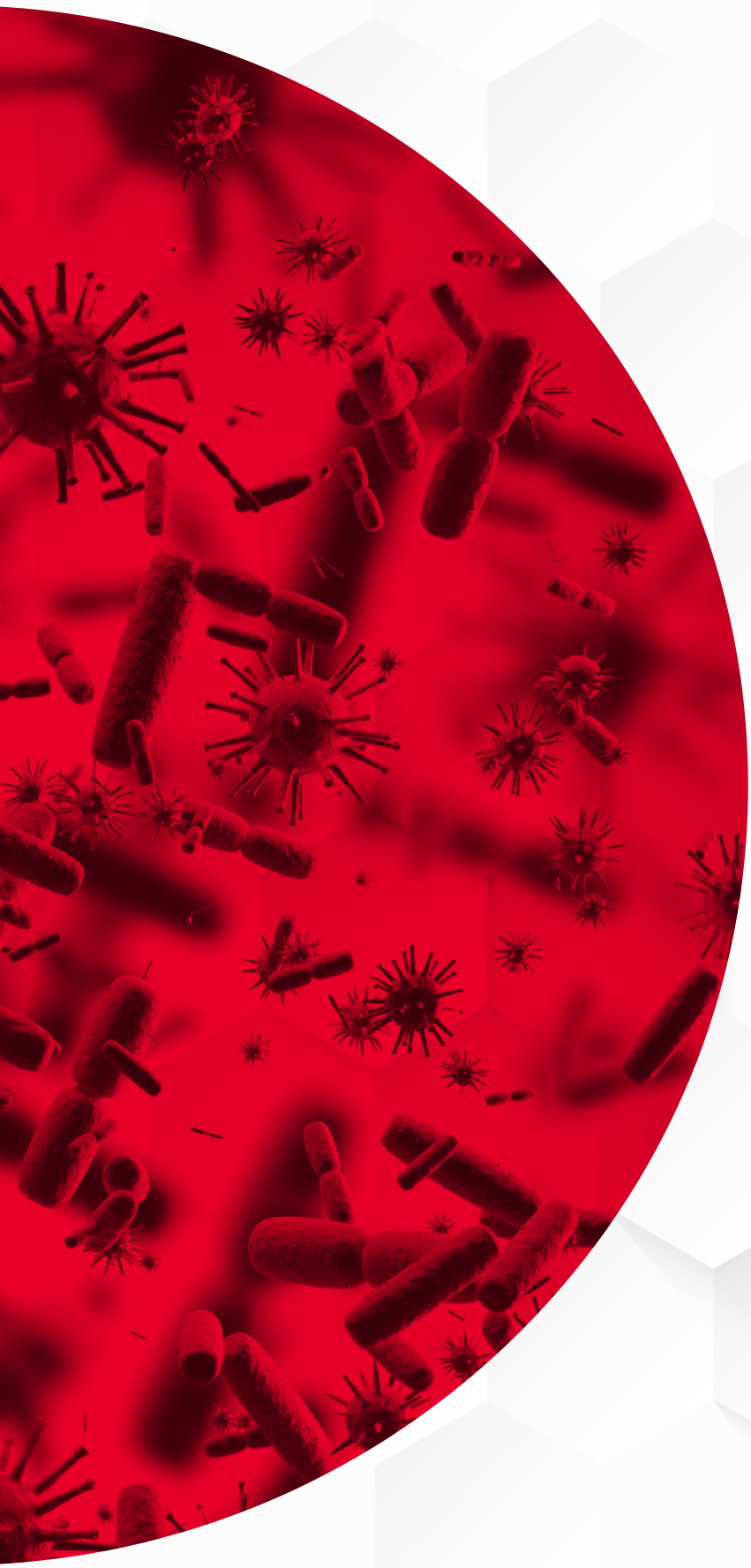
HRZZ
Croatian Science Foundation



Annual report for 2020

Competitive research in a challenging year

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Opening address
by Executive Director

Associate Professor
Irena Martinović Klarić, PhD

The year that passed was an extremely difficult one for all aspects of our society, both in Croatia and across the globe. February 2020 saw the first confirmed cases of the coronavirus in Croatia. Adjusting our personal and professional lives to the pandemic was made even harder by a strong earthquake that hit Zagreb and its surroundings on 22 March. This challenging year ended even more dramatically than it had started, with a series of devastating earthquakes that hit one of the poorest regions in Croatia – Banija – on 28 December, causing massive shocks to both buildings and people.
Having in mind the fact that the pandemic and the earthquake made day-to-day operations of scientific institutions difficult or even impossible as numerous buildings hosting faculties and institutes in Zagreb became unsafe to use, the Foundation tried to adapt to the new circumstances in a timely and appropriate manner. Our work was adjusted to the epidemiological measures in force, while our regular activities and communication with all stakeholders continued with no major difficulties.

Only eight days after the March earthquake and slightly over one month after the arrival of the coronavirus to Croatia, the Foundation became one of the first research funding organizations in Europe to launch a thematic call for proposals related to biomedical, social and educational aspects of the COVID-19 pandemic. The Call "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-2020-04) resulted in eleven Croatian research teams receiving funding and joining the efforts of the global scientific community to make more effective diagnoses and treatments of COVID-19 and enhance the recovery and resilience in the pandemic aftermath.

As the pandemic developed and new issues arose that can only be tackled through scientific research, in November the Foundation launched an additional thematic Call related to the pandemic – "Health, economic and educational effects of the COVID-19 pandemic" (IP-CORONA-2020-12). The procedures related to this Call will be completed in 2021. Research groups to be funded through this Call should contribute to a better understanding of the biology and pathogenesis of the COVID-19 infection and a better clinical and epidemiological characterization of the disease. In addition, it will also be used for funding research in the Social sciences and Humanities which would be able to contribute to the recovery and development of the economy and entrepreneurship and enhancement of teaching methods and educational curricula, including care of vulnerable groups. In order to ensure continuity of implementation of contracted scientific projects and regular disbursement of young researchers' salaries in pandemic conditions and efficient utilization of public funds, the Foundation's Board adopted a decision on amending the dynamics of disbursements for contracted projects. Young researchers' salaries were disbursed monthly, while contracted project funds were disbursed in two instalments. The terms of interim financing remained unchanged. In addition, the Foundation carefully dealt with every question and request related to delays in research.
We received over two hundred requests for amendments to financial and work plans and around fifty requests for extensions of project financing period. We tried finding the optimal solution to each individual request, which would ensure resumption of projects within the timeframe that the Principal Investigators and heads of their organizations considered realistic as well as the transfer of results and unspent funds to following project periods.

Opening address
by Board President

Professor
Dario Vretenar, PhD, F.C.A.

During the crisis year that was 2020, the Foundation disbursed **HRK 185.9 million** for scientific research projects and young researchers' salaries. This amount is HRK 6.3 million lower than the total amount disbursed the year before, which was the highest ever amount disbursed in a single year, but we can nevertheless say that the positive trend of gradually increasing funding for competitive science is still strong. In 2020, the Foundation financed **869 projects and 873 young researchers**.

National funding of scientific research projects continued in 2020 through the Foundation's two core programmes – "Research Projects" and "Installation Research Projects". The Programme "Research Projects" has been established for funding experienced researchers implementing fundamental research whose goal is creating new and enhancing existing knowledge about a specific area as well as applied research that is conducted with clear technological, economic or social aims in mind. On the other hand, the "Installation Research Projects" programme provides support to the establishment of new research groups of young scientists in order to accelerate the establishment of autonomous research careers after the acquisition of a doctoral degree. Having in mind the challenges posed to the scientific community by the pandemic-induced crisis, in 2020 the Foundation also launched two thematic calls as part of the "Research Projects" programme: "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-2020-04) and "Health, economic and educational effects of the COVID-19 pandemic" (IP-CORONA-2020-12). In 2020, the Foundation monitored 655 research and installation projects and evaluated 539 project proposals submitted to three calls that had been launched during the year.

Young researchers can obtain funding through three programmes: "Research Projects", "Installation Research Projects" and "Young Researchers' Career Development Project – Training New Doctoral Students". The programme for training new doctoral students provides stable funding for young researchers' career development and enables mentors to include research-oriented doctoral students into their projects, thus directing their careers toward excellent science. The ultimate goal of these calls is to educate new PhDs, who would pursue a career in competitive research or the industry. The Young Researchers' Career Development Project – Training New Doctoral Students saw 663 doctoral students funded in 2020 – of which 505 were funded from the State Budget and 158 from the European Social Fund. In addition, 145 young researchers have been funded through research and installation projects, 35 were employed to work on projects of scientific collaboration with scientists in diaspora, 25 are involved with projects funded through the Swiss-Croatian Cooperation Programme, while 5 young researchers have been associated with the "Partnership in Research" programme. The Foundation's system of competitive funding in 2020 included **873 young researchers** (791 doctoral students and 82 post-doctoral researchers) and **4,974 Principal Investigators and project team members**.

International programmes were also in full force in 2020. The Foundation continued implementing two programmes funded within the Swiss-Croatian Cooperation Programme: The Croatian-Swiss Research Programme 2017-2023 and Promoting Excellence in Higher Education – Tenure Track Pilot Programme. **The Croatian-Swiss Research Programme** is implemented in cooperation with the Swiss National Science Foundation (SNSF). The programme provides funding for 11 joint research projects of Croatian and Swiss scientists. The **Promoting Excellence in Higher Education – Tenure Track Pilot Programme**, implemented by the Foundation in cooperation with our Swiss partner École polytechnique fédérale de Lausanne (EPFL), provides funding for three projects led by excellent young scientists who arrived/returned to Croatia from Japan, Switzerland and the USA. The implementation of 23 collaborative projects financed within the **Collaboration Programme with Croatian Scientists in Diaspora "Research Cooperability"**, co-funded from the European Social Fund, also resumed in 2020. Due to restrictions to researchers' mobility imposed by pandemic conditions, the programme "Support to Researchers for Applying to ERC Programmes" recorded lower interest. This programme supports cooperation of Croatian researchers with Principal Investigators of projects funded by the European Research Council (ERC), which should be used for gaining experience for preparing their own project proposals for ERC's calls. Only two grants were awarded, while only one researcher was able to complete their mobility scheme.

In 2020, the Foundation initiated various other activities aimed at increasing the inclusion of Croatian scientists and institutions into the European Research Area through the new cooperation mechanism Weave and programmes co-funded from the European Framework Programme (ERA-NET Cofund projects). **Weave** is an instrument whose intention is to simplify the application and selection procedure for joint project proposals which are submitted jointly by researchers from not more than three European countries or regions by conducting a single evaluation procedure. This instrument is a sequel to the bilateral cooperation programme launched between HRZZ and the Slovenian Research Agency (ARRS) in 2019 and the Swiss National Science Foundation (SNSF) in 2020. By 2025, we plan to expand our

collaboration network to other European organizations involved with the Weave initiative. In 2020, the Foundation joined three ERA-NET consortia: **BlueBio** (ERA-NET Cofund on Blue Bioeconomy - Unlocking the potential of aquatic bioresources), **Quantera** (ERA-NET Cofund in Quantum Technologies) and **Chanse** (Collaboration of Humanities and Social Sciences in Europe). Finally, in 2020 the Foundation took part in preparing a new thematic call of the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP), which will be launched in April 2021.

In conclusion, the Foundation's key tasks, as laid out in its mission statement, have been achieved in 2020 despite numerous challenges, caused primarily by the coronavirus pandemic and the disastrous earthquakes, both of which caused a slight drop in the funding allocated to the Foundation. We established a system of regular and highly competitive calls for funding scientific research projects and young researchers' career development, which stimulates research in all areas of science. The Foundation's various programmes extend to over **five thousand** Principal Investigators and team members of research projects. We directly finance salaries of over **nine hundred** young scientists in all scientific disciplines (doctoral students and post-doctoral researchers). This means that, on the one side, a large majority of competitive fundamental scientific projects in Croatia that pull together the best Croatian scientists are funded through the Foundation's programmes; on the other hand, the Foundation established the main system for funding young researchers in Croatia. These numbers show that, if we wish to maintain the level of quality of scientific research funded through HRZZ, future calls should be even more competitive. Through a strict selection of proposed projects and careful monitoring and evaluation of funded research, we will promote a culture of excellence in Croatian science. This is of particular importance if HRZZ's programmes are intended as a steppingstone toward greater inclusion of the Croatian scientific community into the European Research Area. The Foundation started this process through its programme of cooperation with the scientific diaspora, while its extension is the development of various international programmes. These programmes also attracted substantial funds not originating from the State Budget. However, if Croatia wishes to take part in scientific research that improves economic growth and social development on equal terms to other EU Member States, substantially higher budget funds are required to secure stable financing of the system of internationally competitive research in all disciplines of modern science.

Interview with Professor Stipan Jonjić

The year 2020 - a game-changing year for science and the Foundation

Professor **Stipan Jonjić**, PhD, MD is a member of the Foundation's Board and one of the leading virologists alive.

HRZZ: What changed in Croatian and global science in 2020?

S. J. *It is hard to say whether the pandemic brought any positive changes to science. As a positive trend, we could say that scientists started communicating more openly with each other by publishing their results in various pre-print versions before undergoing peer review, which is the standard in academic publishing. One can often get lost in this ocean of non-peer-reviewed publications since high-quality scientific studies which would eventually end up in a top journal are often hard to discern from papers of dubious quality before the review. This might not seem a problem at first sight, but some of these publications have been known to cause a great deal of public controversy as they were often taken as given.*

HRZZ: Which practices that first started to be used during the pandemic period should be retained for the future?

S. J. *We can only hope that the pandemic would raise awareness about the importance of investing into science, fundamental science primarily. Without this, we will be unable to deal with similar situations that require quick response at the global level, which is hard to achieve. In case of the SARS-CoV-2 pandemic, we can truly say that the scientific community responded quickly and efficiently, the end result of which are numerous vaccines which are already in use. In addition, brand new technological platforms have been used for producing vaccines for human use. Some technologies that had never been used for designing vaccines before (such as RNA-based vaccines) suddenly became dominant, whereas this technology or variants thereof will surely become dominant for developing new vaccines, not only against viruses and other infective agents but also vaccines for tumours or autoimmune diseases.*

HRZZ. What are the most significant negative consequences of the pandemic?

S. J. *Apart from the loss of human lives and damage to the healthcare system and the economy, what I perceive as a negative effect is the fact that the world is not ready to play a unique game, that is, to combat these problems on a global level. Selective interests of powerful nations came to the fore, which leaves smaller and poorer countries in an unfavourable position. Apart from being profitable, such behaviour will not be beneficial for rich countries either, which do not seem to understand that microorganisms know not the concept of borders and that this attitude toward global vaccination can only backfire. The EU, as a union and individually, must realise that we need to prepare ourselves for such occurrences and stop relying on others. It turned out the EU failed to act as a true community; instead, particular interests of individual countries emerged, which is not a good sign for the future of this community. It was not hard to predict that the vaccine production capacities in Europe were insufficient and there was enough time to prepare the infrastructure that would ensure high vaccine production rates. I am under the impression that the EU became aware of this and that we should soon expect new production facilities and new vaccinations. This is of utmost importance now that it has become clear that constant changes in the virus' genome make current vaccinations inefficient against reinfection in the long run so new variants of vaccines will be required, especially those that will stimulate mucous membrane immunity, i.e., creating antibodies that are able to neutralise viral particles in the membrane itself. Croatia also needs to reconsider this and prepare better and have strategic projects and develop human resources and technology that would make us more competitive. We should not feel*

"We should not feel downhearted for being a small country; we must show that we can contribute to global protection against any threat, including a pandemic, both scientifically and technologically. In order to achieve this objective, the scientific community needs to be more selective and competitive at the global level. HRZZ plays a major role here."

downhearted for being a small country; we must show that we can contribute to global protection against any threat, including a pandemic, both scientifically and technologically. In order to achieve this objective, the scientific community needs to be more selective and competitive at the global level. HRZZ plays a major role here.

HRZZ. What did we learn from this pandemic? If another pandemic hits us in the future, are we ready for it and how should we respond to it?

S. J. *Another pandemic hitting us is only a matter of time, which forces us to keep researching the biology of various microorganisms and how to deal with epidemics and pandemics. Beside doing research on anticipating pandemics, we will also need to keep developing new technologies for discovering specific medicines and vaccines for viruses and other pathogens, which would enable quicker and more efficient response. We should not allow the scenario, which already happened in the case of SARS and Ebola, that, once the epidemic wanes, the interest in investing in research wears off as well. COVID-19 is a classic example for such a scenario, but at the same time we are aware that numerous similar viruses are out there which would probably, at some point, change their biology and become pathogen to humans. Humans are programmed to think positive, which was the case with this pandemic as well; all of us, the scientific community included, thought that this would all go away on its own or that it will be no different than the common flu. Naturally, the flu is no ordinary disease and will pose a constant threat to humanity, but new technologies for creating vaccines that have been used in the present pandemic will be relevant for designing new flu vaccines as well. Small countries could and should play an important part in this process as we cannot let top science and technology to be a privilege of large countries. Again, this would depend on us and our willingness to promote excellent science at our universities and research institutions.*

"However, the number of projects funded comes second to the fact that HRZZ became independent of politics, which means that rules of project evaluation and monitoring became similar or identical to those that are considered standard in countries with longer traditions and which science foundations have been applying for decades."

HRZZ. As a member of the Croatian Science Foundation's Board in two terms, how do you see HRZZ's role in the current national system of funding science?

S. J. *HRZZ certainly played a key role in the development of Croatian science, most notably in the last decade. This period saw drastic improvements to the system for evaluating scientific projects while more regular funding enabled us to approve around 1,200 projects. The great majority of Croatian scientists are now aware of HRZZ's role, without which the future of our science is hard to imagine. However, the number of projects funded comes second to the fact that HRZZ became independent of politics, which means that rules for project evaluation and monitoring became similar or identical to those that are considered standard in countries with longer traditions and which science foundations have been applying for decades. However, there is still room for improvement, which is where Croatian scientists sitting in evaluation panels play an important part. Our scientific community lacks experience and tradition in such funding instruments as provided by HRZZ, which can sometimes lead to misunderstandings, but we should be aware that there is no ideal evaluation procedure and there is always room for oversights and misjudgements. But this should not be a justification for putting pressure on HRZZ and creating an environment of mistrust through generalised assessments. The Foundation should keep self-evaluating its work as well as assessing the effect of projects on the scientific productivity of PIs and their institutions. Unfortunately, there are still institutions that consider science a necessary evil and discourage excellence, which is in stark contrast to the mission of scientific institutions and universities. Without such an organization, which naturally has room for improvements, further development of Croatian science would be hard to imagine. Personally, I keep repeating over and over that HRZZ must remain independent, but at the same time must also be aware of its role and responsibility for the development of our science and do everything it can to overcome potential problems and weaknesses, which are present. HRZZ established a high-quality system of monitoring funded projects; in addition, a great number of project managers and other professional staff was educated to take care of various aspects of project evaluation and monitoring.*

HRZZ. How do you see HRZZ's future? In which aspects can HRZZ be considered a leader, and which are lagging behind, i.e., which sections of the scientific system require additional investment?

S. J. *I am highly optimistic when talking about the future of HRZZ as the key national institution for ensuring the progress of science but also for the development of Croatian academic institutions; without excellent science we cannot have excellent universities. In this sense, I believe that, together with the Ministry of Science and Education and Croatian academic institutions, we should increase our efforts in the area of scientists' mobility in order to make science more decentralised; Croatia is a small country and our progress is greatly defined by the development of universities, which are regionally distributed. We can often hear that we are too small a country to be developing fundamental science and that we should focus on applied sciences instead. It is natural to want some of the investment into science to be returned in the form of commercialization of the results of our scientific work, but we should realise that this is not simple as we can only translate something that is of high quality – in other words, only good science can contribute to the development of technology or some product of a commercial interest. In this pandemic period, we often ask ourselves whether we could have, or should have, worked on developing vaccines, either on our own or in collaboration. We should have been aware of this thirty years ago and started investing in people, knowledge and intellectual protection of this knowledge and technology back then. However, it is never too late and if we follow the premisses of science development and scientific excellence, we will be able to join scientifically and technologically more developed countries. I repeat, HRZZ should play a crucial role in this process as it developed into an institution that has the experience, knowledge and capacities for evaluating and monitoring with the ultimate objective of stimulating excellent science.*

The Foundation's **organisational structure**

Pursuant to the Act on the Amendments to the Croatian Science Foundation Act (Official Gazette 78/2012), the Foundation's Bodies are the Board and Executive Director. Besides the Foundation's bodies, the work of the Foundation in 2020 also involved evaluation panels, peer reviewers and the Foundation's administrative office, which is organised into five departments.

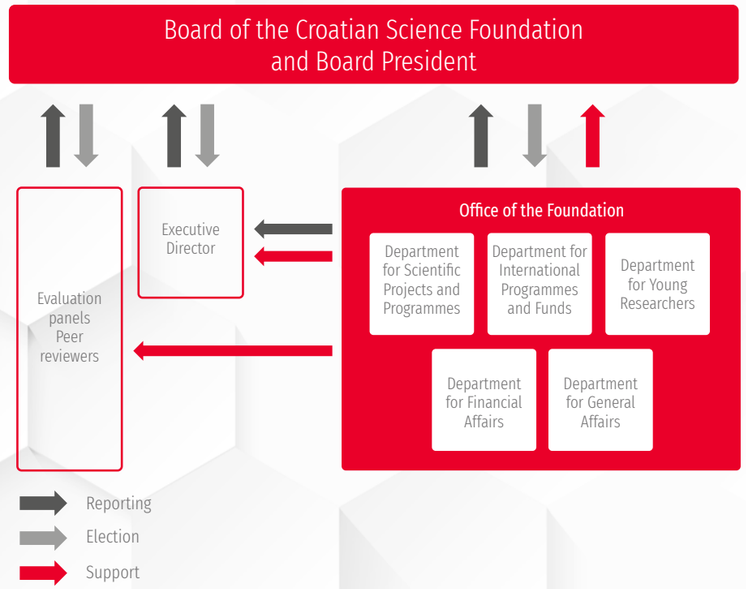


Figure 1. Organisational structure of the Croatian Science Foundation

THE BOARD

Pursuant to the Act on the Croatian Science Foundation, the Foundation is managed by the Board, the body that adopts the Foundation's legal acts and grant award decisions, manages and monitors the Foundation's activities, proposes the Foundation's strategic plan and conducts other activities pursuant to the Act and the Statute.

Board members are appointed from the pool of excellent Croatian scientists, especially those with results recognized at the international level, taking into account that all scientific areas are represented. They are appointed by the Croatian Parliament, upon nomination by the Government of the Republic of Croatia. The Government establishes a list of candidates for Board members upon nomination by scientific institutes, the Croatian Rectors' Conference, university Senates, the Croatian Academy of Sciences and Arts, Croatian Chamber of Commerce, employers' associations, National Council for Science and individual scientists and academics, following a public call for nominations published by the Ministry of Science and Education. Board members are elected to a five-year term, renewable once. The current Board's term of office expired in April 2018; however, pursuant to the Statute, the Board remains in seat until the Parliament appoints new members so that the Foundation's activities are not disrupted.

The Board held 30 sessions in 2020, 10 of which were live sessions and 20 electronic sessions.

EXECUTIVE DIRECTOR

The Executive Director is in charge of the Foundation's operations and manages the work of the Foundation's Office. Pursuant to the provisions of the Act on the Amendments to the Croatian Science Foundation Act (Official Gazette 78/12), the Executive Director is selected following a public call to a five-year term and is appointed and released from duty by the Board.

At its 122nd session, held on 16 November 2018, the Board appointed Dr Irena Martinović Klarić, PhD, to the position of Executive Director, who assumed her office in January 2019 for a five-year term.

THE FOUNDATION'S OFFICE

The Foundation's office is divided into five departments: Department for Scientific Projects and Programmes, Department for Young Researchers, Department for International Programmes and Funds, Department for Financial Affairs and Department for General Affairs.

On 31 December 2020, the Foundation had 33 employees (5 employees are funded from the European Social Fund). All the Foundation's employees have full-time contracts.

The Foundation's Board:

Professor Dario Vretenar, PhD, F.C.A., President
-
Professor Dean Ajduković, PhD, Deputy President
-
Dr Smiljana Goreta Ban, PhD
-
Professor Stipan Jonjić, PhD, MD
-
Professor Ljiljana Marks, PhD
-
Professor Dragan Poljak, PhD
-
Professor Pavao Rudan, PhD, MD, F.C.A.

EVALUATION PANELS

1) LIFE SCIENCES

PANEL ZŽ1

(BASIC MEDICAL SCIENCES, BIOLOGY (BIOCHEMISTRY AND MOLECULAR BIOLOGY, GENETICS, GENERAL BIOLOGY), BIOTECHNOLOGY IN BIOMEDICINE)

dr. sc. Tihomir Balog
prof. dr. sc. Hrvoje Banfić
prof. dr. sc. Ines Drenjančević
prof. dr. sc. Srećko Gajović
dr. sc. Koraljka Gall Trošelj
dr. sc. Maja Herak Bosnar
izv. prof. dr. sc. Ivana Ivančić Baće
dr. sc. Silva Katušić Hećimović
dr. sc. Zrinka Kovarik
izv. prof. dr. sc. Mirela Sedić
prof. dr. sc. Astrid Krmpotić

PANEL ZŽ2

(CLINICAL MEDICINE, VETERINARY MEDICINE, DENTAL MEDICINE)

dr. sc. Slaven Abdović
prof. dr. sc. Iva Alajbeg
doc. dr. sc. Nicholas J. Bradshaw
dr. sc. Dragan Brnić
prof. dr. sc. Iva Dekaris
prof. dr. sc. Marija Heffer
prof. dr. sc. Igor Prpić
doc. prim. dr. sc. Vladimira Vuletić
prof. dr. sc. Maja Popović

PANEL ZŽ3

(PUBLIC HEALTH AND HEALTH PROTECTION, PHARMACY, BIOTECHNOLOGY, FOOD PROCESSING TECHNOLOGY, NUTRITION, KINESIOLOGY)

prof. dr. sc. Mladen Brnčić
prof. dr. sc. Daniela Čačić Kenjerić
prof. dr. sc. Karin Kovačević Ganić
izv. prof. dr. sc. Jasmina Lovrić
prof. dr. sc. Ana Marušić
izv. prof. dr. sc. Pavle Mikulić
izv. prof. dr. sc. Kristina Pilipović
izv. prof. dr. sc. Jelka Pleadin
prof. dr. sc. Ivana Radojčić Redovniković

PANEL ZŽ4

(AGRICULTURE, FORESTRY, WOOD TECHNOLOGY, BIOLOGY (BOTANY, ECOLOGY, ZOOLOGY, EVOLUTION AND PHYLOGENY)

doc. dr. sc. Vilim Filipović
prof. dr. sc. Marilena Idžojtić
izv. prof. dr. sc. Živana Ninčević Gladan
dr. sc. Dario Novoselović
dr. sc. Igor Pasković
prof. dr. sc. Melita Peharda Uljević
prof. dr. sc. Marina Piria
prof. dr. sc. Vlatka Rozman
dr. sc. Branka Salopek Sondi
doc. dr. sc. Anamaria Štambuk
prof. dr. sc. Neven Voća
dr. sc. Goran Zdunić

2) SOCIAL SCIENCES AND HUMANITIES

DHZ1

(ECONOMICS, INFORMATION AND COMMUNICATION SCIENCES, POLITICAL SCIENCES, SECURITY STUDIES, DEMOGRAPHY, LAW)

Izv. prof. dr. sc. Nebojša Blanuša
dr. sc. Jelena Budak
prof. dr. sc. Mirjana Čižmešija
Izv. prof. dr. sc. Maja Čukušić
prof. dr. sc. Edita Čulinović-Herc
prof. dr. sc. Saša Nikšić
izv. prof. dr. sc. Dagmar Radin
Izv. prof. dr. sc. Markus Schatten
izv. prof. dr. sc. Nebojša Stojčić
prof. dr. sc. Hrvoje Šimović

DHZ2

(PEDAGOGY, PSYCHOLOGY, EDUCATION AND REHABILITATION SCIENCES, SPEECH THERAPY, SOCIOLOGY, SOCIAL WORK, EDUCATION SCIENCES, GENDER STUDIES)

prof. dr. sc. Branislava Baranović
prof. dr. sc. Dejana Bouillet
prof. dr. sc. Dinka Čorkalo Biruški
prof. dr. sc. Renata Franc
izv. prof. dr. sc. Silvija Ručević
izv. prof. dr. sc. Iva Šverko
prof. dr. sc. Inga Tomić-Koludrović
prof. dr. sc. Jasminka Zloković

DHZ3

(ETHNOLOGY AND ANTHROPOLOGY, ART SCIENCE, ART HISTORY, HISTORY, ARCHAEOLOGY)

dr. sc. Irena Benyovsky Latin
izv. prof. dr. sc. Jasenka Gudelj
prof. dr. sc. Zdenka Janeković Römer
prof. dr. sc. Robert Matijašić
dr. sc. Milan Pelc
prof. dr. sc. Tihana Petrović Leš
prof. dr. sc. Anita Sujoldžić
prof. dr. sc. Mario Šlaus
izv. prof. dr. sc. Domagoj Tončinić
dr. sc. Tvrtko Zebec

DHZ4

(PHILOLOGY, THEOLOGY, PHILOSOPHY)

prof. dr. sc. Marija Brala Vukanović
izv. dr. sc. Nikica Mihaljević
izv. prof. dr. sc. Marina Protrka Štimec
dr. sc. Kristina Štrkalj Despot
izv. prof. dr. sc. Predrag Šustar
izv. prof. dr. sc. Marko Vučetić

3) NATURAL SCIENCES AND TECHNICAL SCIENCES

PTZ1

(MATHEMATICS, COMPUTER SCIENCE)

prof. dr. sc. Nenad Antonić
prof. dr. sc. Dean Crnković
prof. dr. sc. Domagoj Jakobović
prof. dr. sc. Sanja Singer
izv. prof. dr. sc. Lea Skorin-Kapov
izv. prof. dr. sc. Ljiljana Šerić
prof. dr. sc. Ninoslav Truhar
prof. dr. sc. Zoran Vondraček

PTZ2

(ARCHITECTURE AND URBAN PLANNING, GEODESY, GEOPHYSICS, CIVIL ENGINEERING, GEOLOGY, GEOGRAPHY, GRAPHIC TECHNOLOGY, TEXTILE TECHNOLOGY, MINING, PETROLEUM AND GEOLOGIC ENGINEERING)

prof. dr. sc. Dražen Balen
prof. dr. sc. Vlasta Ćosović
izv. prof. dr. sc. Ivana Herceg Bulić
prof. dr. sc. Gordan Jelenić
akademik Mladen Juračić
prof. dr. sc. Goran Kniewald
izv. prof. dr. sc. Aleksandar Lukić
doc. prof. dr. sc. Igor Majnarić
doc. dr. sc. Ivana Miličević
prof. dr. sc. Tatjana Rukavina
prof. dr. sc. Zenun Skenderi
dr. sc. Kosta Urumović

PTZ3

(ELECTRICAL ENGINEERING, NAVAL ARCHITECTURE, METALLURGY, MECHANICAL ENGINEERING, TRAFFIC AND TRANSPORT TECHNOLOGY, AERONAUTICS, ROCKET SCIENCE AND SPACE TECHNOLOGY)

doc. dr. sc. Neven Alujević
izv. prof. dr. sc. Marinko Barukčić
prof. dr. sc. Neven Duić
izv. prof. dr. sc. Igor Karšaj
izv. prof. dr. sc. Stjepan Stipetić
izv. prof. dr. sc. Silvestar Šesnić
prof. dr. sc. Mario Štorga
izv. prof. dr. sc. Hrvoje Pandžić

PTZ4

(PHYSICS)

dr. sc. Osor-Slaven Barišić
dr. sc. Athanasios Chatzistavrakidis
doc. dr. sc. Matko Glunčić
dr. sc. Vibor Jelić
prof. dr. sc. Ivan Kokanović
izv. prof. dr. sc. Mihael Makek
prof. dr. sc. Blaženka Melić
prof. dr. sc. Mladen Petravić
izv. prof. dr. sc. Danko Radić
prof. dr. sc. Denis Sunko

PTZ5

(CHEMISTRY, CHEMICAL ENGINEERING)

dr. sc. Irena Ciglenečki-Jušić
prof. dr. sc. Tomica Hrenar
prof. dr. sc. Igor Jerković
dr. sc. Srećko Kirin
dr. sc. Dean Marković
prof. dr. sc. Ines Primožič
dr. sc. Zoran Štefanić
prof. dr. sc. Vesna Tomašić
dr. sc. Mario Vazdar
prof. dr. sc. Višnja Vrdoljak

Activities
in 2020

JANUARY

Call for Proposals "Young Researchers' Career Development Project – Training New Doctoral Students" (DOK-2020-01) closed

Call for Proposals "Research Projects – Slovenian-Croatian Bilateral Projects" (IPS-2020-01) closed)

FEBRUARY

Calls "Research Projects" and "Installation Research Projects" (IP/UIP-2020-02) closed

MARCH

Call for Proposals "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-2020-04) launched

APRIL

Call for Proposals "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-2020-04) closed

MAY

DOK-2020-01 Call results published

JUNE

BlueBio (ERA-NET Cofund Project in Blue Bioeconomy – Unlocking the Potential of Aquatic Bioresources) Call for Proposals launched

JULY

IP-CORONA-2020-04 Call results published

Call for Proposals "Research Projects – Swiss-Croatian Bilateral Projects" (IPCH-2020-10) launched

SEPTEMBER

BlueBio Call closed

IPS-2020-01 Call results published

OCTOBER

Call for Proposals "Research Projects – Swiss-Croatian Bilateral Projects" (IPCH-2020-10) closed

NOVEMBER

Call for Proposals "Health, economic and educational effects of the COVID-19 pandemic" (IP-CORONA-2020-12) launched

DECEMBER

Weave – new system of funding cross-border research launched

IP/UIP-2020-02 Call results published

Call "Health, economic and educational effects of the COVID-19 pandemic" (IP-CORONA-2020-12) closed

The Foundation's programmes

NATIONAL FUNDING PROGRAMMES

- Research Projects (IP)
- Installation Research Projects (UIP)
- Research Projects – CORONA (IP-CORONA)
- Programme of Supporting Research and Development Activities in the Area of Climate Change (PKP)

YOUNG RESEARCHERS' CAREER DEVELOPMENT

- Training New Doctoral Students (DOK)

INTERNATIONAL PROGRAMMES

- Croatian-Swiss Research Programme (CSRP)
- Excellence in Higher Education - Tenure Track Pilot Programme (TTP)
- Cooperation Programme with Croatian Scientists in Diaspora "RESEARCH COOPERABILITY" (PZS)
- Bilateral and multilateral cooperation – WEAVE
- Trans-Atlantic Platform for Social Sciences and Humanities (T-AP)
- ERA-NET Co-fund in Quantum Technologies (QuantERA)
- ERA-NET Co-fund in Blue Bioeconomy (BlueBio)
- HERA-NORFACE ERA-NET Co-fund (CHANSE)

MOBILITY

- Support to Researchers for Applying to European Research Council Programmes

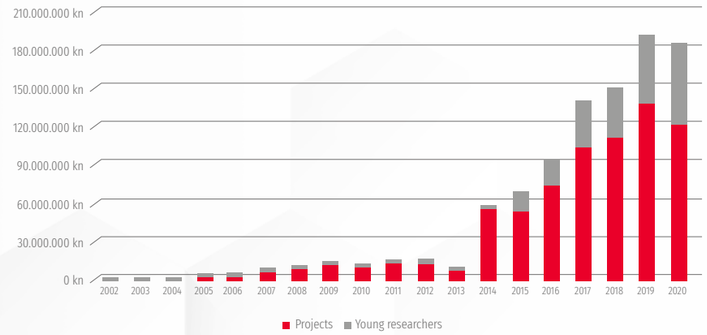
BUILDING CROATIAN PROFESSIONAL TERMINOLOGY

COLLABORATION WITH THE ECONOMIC SECTOR

- Partnership in Research (PAR)

The Foundation's programme **funding** in 2020

In 2020, the Foundation disbursed HRK 185.9 million for scientific research projects and young researchers' career development (which is HRK 6.3 million less than the amount disbursed the year before, which was the highest ever amount disbursed in a single year). In sum, from its establishment in 2001 until the end of 2020, the Foundation disbursed over HRK 971 million in total for projects and young researchers.



Between 2020 and 2020, we disbursed a total of HRK 971,025,583 of funding for scientific projects and young researchers

Figure 2. Annual amounts of funding for scientific research projects and young researchers in the period 2002-2020

As in previous years, the majority of funds disbursed in 2020 originated from the State Budget of the Republic of Croatia (c. 85%), while other sources include ESI Funds and international collaboration (Swiss-Croatian Cooperation Programme).

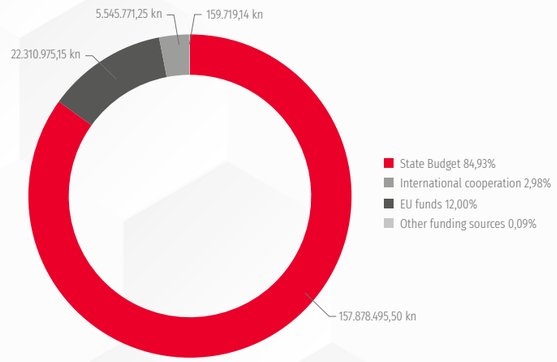


Figure3. Funding sources in 2020

The eight programmes implemented in 2020 saw a total of 869 projects and 873 young researchers funded. The largest part of funds was disbursed to research projects (HRK 86.08 million, or 46% of the Foundation's budget), young researchers (HRK 63.91 million, or 34% of the budget) and installation research projects (HRK 27.77 million or 15% of the budget).

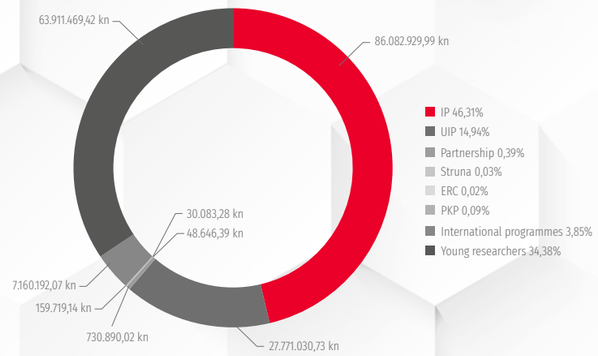


Figure 4. Programmes and projects funded in 2020

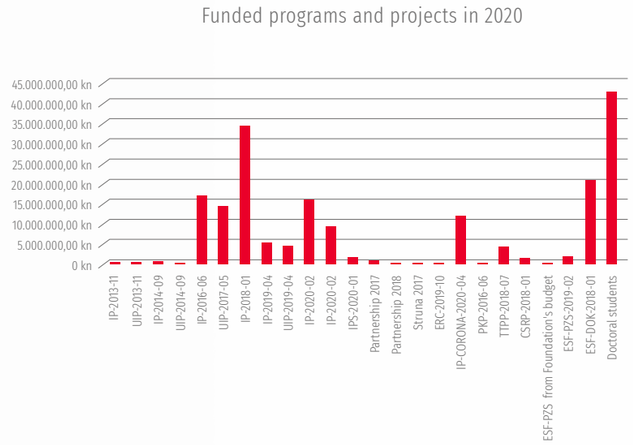


Figure 5. Programmes funded in 2020 broken down by individual calls

Young researchers are supported through the following programmes: "Young Researchers' Career Development Project – Training New Doctoral Students" (doctoral students), "Installation Research Projects" (doctoral students and post-doctoral researchers) and "Research Projects" (post-doctoral researchers). The Young Researchers' Career Development Project is financed from two sources – State Budget and European Social Fund. In 2020, the majority of funds disbursed through the "Young Researchers' Career Development Project" originated from the State Budget (68%), while the remaining 32% came from the European Social Fund.

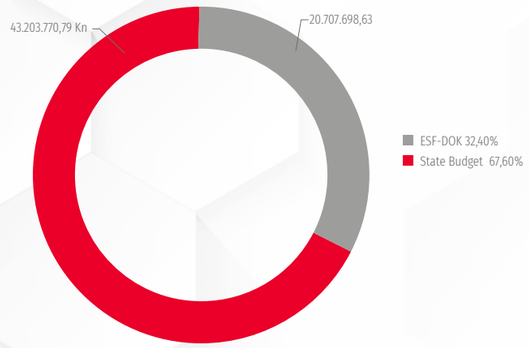


Figure 6. Funding for young researchers in 2020 broken down by funding sources

National funding programmes

Research
Projects

Amount of funding for Programme in 2020
HRK 72.61 million

The Programme "Research Projects" has been established for funding fundamental research whose goal is creating new and enhancing existing knowledge about a specific area as well as applied research that is conducted with clear technological, economic or social aims in mind. The research topic needs to be internationally recognisable and/or nationally relevant, while the applicant needs to have an excellent scientific track record. Research projects are based on strong research teams formed at Croatian scientific institutions and include integration of scientific organisations, research and equipment, development of research capacity and planning the development of young researchers. The maximum duration of research projects is 48 months, and the maximum amount of funding lies between HRK 1,000,000 and 1,500,000 (HRK 600,000 and 900,000 for projects in the Social sciences and Humanities).

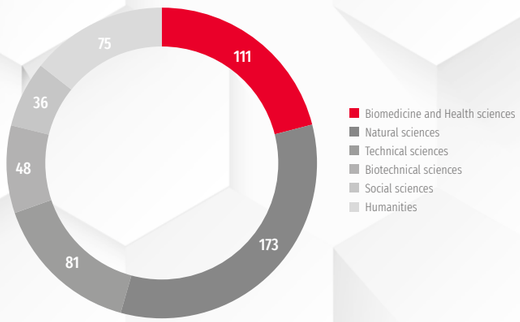


Figure 7. Number of funded and monitored projects through the Research Projects programme in 2020 broken down by areas of science

In 2020, we monitored the implementation of 524 research projects. We disbursed HRK 56,804,601.11 to these projects on the basis of evaluations conducted by 459 scientists. A total of 4,701 scientists are engaged in research projects (Principal Investigators and team members), including 57 post-doctoral researchers directly employed for the purpose of project implementation. The largest number of projects are funded in the Natural sciences (33%) and Biomedicine and Health sciences (21%) (Figure 7), while the institutions implementing the largest number of projects are Ruđer Bošković Institute and three faculties of the University of Zagreb – Faculty of Science, School of Medicine and Faculty of Electrical Engineering and Computing.

In 2020, the Foundation's research projects achieved the following results: 36 books and book chapters published, 147 conference abstracts, 37 collections of papers, 113 doctoral/master/graduation theses, 525 papers in academic journals, 8 other types of publications, 3 patent applications, while project results were disseminated through 1,287 lectures, invited lectures or scientific conferences organised.

In late 2020, we completed the evaluation of proposals submitted to the Call IP-2020-02, whose overall budget planned for the first year of implementation amounted to HRK 40,000,000.00. We received 293 applications, the majority of which were submitted in the areas of Natural sciences (75 proposals, or 25%) and Biomedicine and Health sciences (65 proposals, or 22%) (Figure 8). The two-step evaluation procedure included 124 Croatian scientists involved in the work of 13 evaluation panels and 455 foreign peer reviewers. The majority of peer reviewers were recruited from EU countries, most notably Germany and Italy, as well as the USA.

A total of 107 projects were recommended for funding, which amounts to 36.5% success rate. The largest number of funded projects will be implemented at the University of Zagreb and Ruđer Bošković Institute (Figure 9). The highest success rate was reported

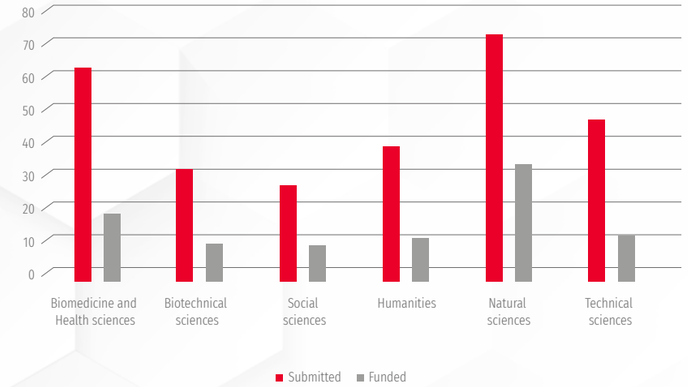


Figure 8. Number of submitted and funded projects through Call IP-2020-02 broken down by areas of science

in Natural sciences (48%), while Technical sciences recorded the lowest success rate (28.57%). By the end of 2020, we disbursed a total of HRK 15,803,173.03 for projects funded through the Call IP-2020-02.

Gender distribution of applicants to this Call was uniform in most areas of science except Biomedicine and Health sciences and Natural sciences, which feature more female PIs, whereas Technical sciences are dominated by male PIs. Female PIs recorded

slightly lower success rates (34.69%) relative to their male counterparts (38.35%). The highest success rate of female scientists was recorded in Social sciences, while male scientists recorded the highest success rate in Technical sciences.

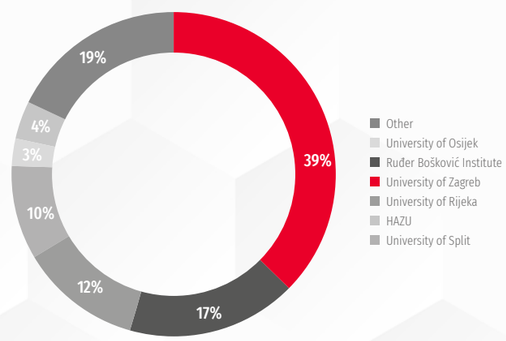


Figure 9. Projects funded through Call IP-2020-02 broken down by institutions

*The figure shows data for individual institutions where more than 3 projects are funded. Apart from this, funded projects are also implemented at the following institutions (shown collectively as "Other" in Figure above): Institute of Physics, Institute for Adriatic Crops and Karst Reclamation, Institute for Medical Research and Occupational Health, Institute of Agriculture and Tourism, University of Zadar, The Institute of Economics, Croatian Geological Survey, Croatian Institute of History, Catholic University of Croatia, Institute of Social Sciences Ivo Pilar, Institute for Social Research in Zagreb, Institute of Oceanography and Fisheries, University Hospital for Infectious Diseases "Dr Fran Mihaljević", Juraj Dobrila University in Pula.

Research Projects

CORONA

Amount of funding for Programme in 2020

HRK 11.95 million

In these exceptional and highly demanding circumstances caused by the COVID-19 pandemic and the earthquake that hit Zagreb in March, the Croatian Science Foundation, as part of its overall mission, provided support to research groups that are able to contribute to solving what are currently the greatest challenges in research for the purpose of saving human lives and retaining health and well-being of the population of the Republic of Croatia. In late March, we launched the Call for Proposals "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-2020-04). This thematic Call will finance fundamental and applied research that creates new and improves existing knowledge on infectious diseases caused by corona viruses.

The four basic topics covered by the Call were as follows: 1. Immune response and development of novel diagnostic approaches to COVID-19; 2. Development of new vaccines, treatments as well as drugs and agents for COVID-19 inhibition; 3. Social aspects of the COVID-19 pandemic; 4. Educational aspects of the pandemic. The overall budget of the Call was set at HRK 14,000,000.00, while the budget of individual projects was set between HRK 600,000 and 1,500,000.00. The projects are funded for a period of 18 months.

The Call closed on 20 April and 98 proposals were submitted in total. The largest number of submitted proposals covered the topic "Social aspects of the COVID-19 pandemic" (32 proposals) and "Immune response and development of novel diagnostic approaches to COVID-19" (31 proposals). On the basis of the assessment done by two foreign peer reviewers, final opinion of the Evaluation Panel and ranking list prepared by each Panel, 11 projects were selected for funding, which started their implementation phase in July. Principal Investigators of three projects are hosted by the University of Rijeka School of Medicine, while the other projects are implemented at the following institutions: University of Zagreb Centre for Research and Knowledge Transfer in Biotechnology, Ruđer Bošković Institute, GENOS d.o.o., Institute for Social Research, Faculty of Humanities and Social Sciences, University of Rijeka Department of Informatics, University of Rijeka Faculty of Law and University of Zagreb Faculty of Science (1 project each). The Call success rate was 11.22%.

In late 2020, we launched another IP-CORONA Call – "Health, economic and educational effects of the COVID-19 pandemic" (IP-CORONA-2020-12), with new research topics defined: Health aspects of the pandemic; Economic and legal aspects of the pandemic and Educational and pedagogic aspects of the pandemic. A total of 63 project proposals were submitted, the majority of which for the topic Health aspects of the pandemic (33 proposals). The overall budget of the Call was set at HRK 14,000,000.00, while the budget of individual projects was set between HRK 600,000 and 1,500,000.00 for a period of 18 months. Financing is expected to start in spring 2021.

Research Projects

Slovenian-Croatian Bilateral Projects

Amount of funding for Programme in 2020

HRK 1.5 million

Pursuant to the Bilateral Collaboration Agreement between the Slovenian Research Agency (ARRS) and the Croatian Science Foundation (HRZZ), in December 2019 the Croatian Science Foundation published the Call for co-financing the Croatian part of Slovenian-Croatian joint research projects. The Lead Agency for this Call, which conducted the evaluation of proposals, was ARRS. A total of 42 joint project proposals were submitted, 8 of which were eventually recommended for financing and contracted. The total amount of contracted funds for these projects stands at HRK 6,378,617.00, of which HRK 1,523,879.50 was disbursed in 2020.

Research Projects

Swiss-Croatian Bilateral Projects

Pursuant to the Multilateral Lead Agency Agreement (MLA) and its Annex and the Bilateral Agreement signed with the Swiss National Science Foundation (SNSF), in July 2020 the Croatian Science Foundation published the Call for co-financing the Croatian part of Swiss-Croatian joint research projects. The Lead Agency for this Call, which conducted the evaluation of proposals, was SNSF.

The Call closed on 1 October 2020. A total of five project proposals were submitted, all of which passed the eligibility check and were referred to evaluation. The total amount of requested funds stands at **HRK 5,627,837.63.** The Call results will be published in 2021.

Installation Research Projects

Amount of funding for Programme in 2020

HRK 27.77 million

The goal of the Programme "Installation Research Projects" (UIP) is providing support to the establishment of new research groups of young scientists in order to accelerate the establishment of autonomous research careers after the acquisition of a doctoral degree. Scientists who were evaluated positively will have the opportunity to establish their own research groups that will engage in innovative research topics. Young scientists should use the funding provided by HRZZ in a five-year period to set up their research teams and labs by recruiting doctoral students and post-doctoral researchers as well covering research costs and acquiring scientific equipment. The research topic of these projects needs to be internationally recognisable and/or nationally relevant, while the applicant needs to have an excellent scientific track record. The maximum duration of installation research projects is 60 months, and the maximum amount of funding is between HRK 500,000.00 and 2,000,000.00 (or HRK 1,500,000.00 for projects in the Social sciences and Humanities).

In 2020, we monitored the implementation of 131 installation research projects. We disbursed **HRK 18,536,373.36** to these projects on the basis of evaluations or reports conducted by 217 scientists. A total of 836 scientists are engaged in installation research projects (Principal Investigators and team members), including 78 doctoral students and 10 post-doctoral researchers directly employed for the purpose of project implementation. The largest number of projects are funded in the Natural sciences (29%) and Technical sciences (27%) (Figure 10), while the institutions implementing the largest number of projects are the Faculty of Science and Faculty of Electrical Engineering and Computing (both University of Zagreb and Ruđer Bošković Institute). In 2020, the Foundation's installation research projects achieved the following results: 24 books and 197 book chapters published, 1,066 conference abstracts, 282 collections of papers, 268 doctoral/master/graduation theses, 831 papers in academic journals, 53 other types of publications, 3 patent applications, while project results were disseminated through 378 lectures, invited lectures or scientific conferences organised.

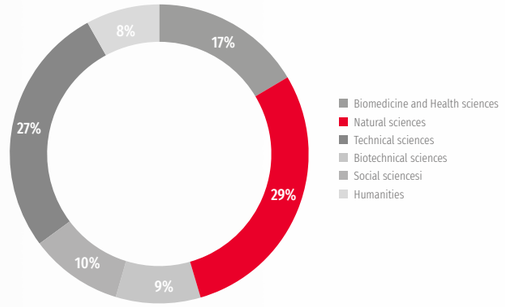


Figure 10. Number of funded and monitored projects through the Installation Research Projects programme in 2020 broken down by areas of science

In late 2020, we completed the evaluation of proposals submitted to the Call UIP-2020-02, whose overall budget planned for the first year of implementation amounted to HRK 20,000,000.00. We received 148 applications, the majority of which were submitted in the areas of Natural sciences (33 proposals, or 25%) and Biomedicine and Health sciences (24 proposals, or 22%) (Figure 11). The two-step evaluation procedure included 124 Croatian scientists involved in the work of 13 evaluation panels and 199 foreign peer reviewers. The majority of peer reviewers were recruited from EU countries, most notably Italy, France and Spain, as well as the UK and USA.

A total of 49 projects were recommended for funding, which amounts to 33.10% success rate. The highest success rate was reported in the Natural sciences (45.45%) while Biotechnical sciences recorded the lowest success rates (15%). The largest number of projects funded through this Call is implemented at various faculties of the University of Zagreb (Figure 12). By the end of 2020, we disbursed a total of HRK 9,234,657.37 for projects funded through the Call UIP-2020-02.

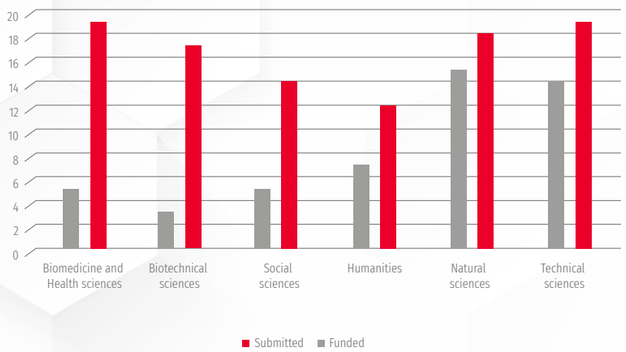


Figure 11. Number of submitted and funded projects through Call UIP-2020-02 broken down by areas of science

Gender distribution of applicants to this Call was uniform in most areas of science except Biomedicine and Health sciences, Social sciences and Natural sciences, which feature more female PIs, whereas Technical sciences are dominated by male PIs. Female PIs recorded slightly lower success rates (30.12%) relative to their male counterparts (36.92%). The highest success rate of female scientists was recorded in the Humanities.

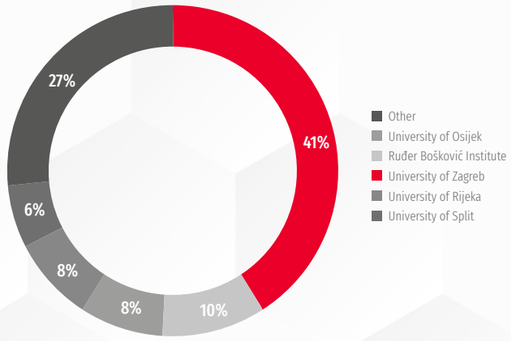


Figure 12. Projects funded through Call UIP-2020-02 broken down by institutions

*The figure shows data for individual institutions where more than 3 projects are funded. Apart from this, funded projects are also implemented at the following institutions (shown collectively as "Other" in Figure above): Institute of Physics, Croatian Geological Survey, Croatian Veterinary Institute, Institute of Social Sciences Ivo Pilar, Institute of Oceanography and Fisheries, Institute of Archaeology, Institute of Agriculture and Tourism, University of Dubrovnik, University of Zadar.

Programme of Supporting Research and Development Activities in the Area of Climate Change

Amount of funding for Programme in 2020
HRK 159.72 thousand

The Government of the Republic of Croatia, at its 264th session held on 5 November 2015, adopted the Decision on Launching the Programme of Supporting Research and Development Activities in the Area of Climate Change for 2015-2016. The Programme funded 10 projects from disciplines which constitute priority topics in the area of climate change. The Call topics included: Renewable energy sources, Agriculture, Adaptation to climate change, Low-carbon development, Energy efficiency and Transport. The goal of the Programme is to support research and developmental activities in the field of climate change mitigation and adaptation. The overall budget of the Call amounted to HRK 17,000,000.00.

All ten funded projects finished their implementation stage in 2019. Nine projects were evaluated upon their completion in 2019. In 2020, the final project was evaluated and its final instalment was disbursed in the amount of HRK 159,719.14. This brings the total amount disbursed to projects upon their completion to **14.037.737,86 kuna.**

This Programme managed to make a strong contribution to the research and development culture at the national level by setting up a research network and creating a unique knowledge database. Further funding plans are required which will enable the research community to actively participate with the goal of enhancing the scientific capacity of the academic community. Upon successful completion of projects funded through this Programme, some issues remain open, such as sustainable society, conservation of national resources, energy efficiency and maintaining national priorities, all of which require further planned funding of research in the area of climate change.

Partnership in Research

Amount of funding for Programme in 2020

HRK 730.89 thousand

The Programme supports partnerships in research between public universities or public scientific institutes in Croatia and extra-budgetary sources of funding (not funded from the State Budget) from Croatia or from abroad: companies, local government units, foreign research funding agencies and foundations, foreign scientific organisations). The beneficiary of the grant is a researcher employed at a public scientific institution in Croatia, whose project partnership may establish or develop existing collaboration for the purpose of implementing scientific research whose results will be applicable in industry or society. Research costs of the scientific institution are covered by the Foundation, while the partner organization (one or more) should provide at least 50% of the total project value. The overall amount is disbursed to the account of the public institution.

The Programme is intended to provide support to relevant scientific research that is able to enhance the development of new and existing enterprises and attract representatives of partner organizations that would be able to substantially contribute to the economic, technological and social development of the Republic of Croatia. The specific objective of the Programme is to implement research in partnership in order to: conduct research with potential for having a visible an relevant economic or social impact, enhance the link between Croatian public scientific institutions and the economy, enable the transfer of knowledge and connect with the beneficiaries of research results.

There have not been any new calls launched in 2020 within this Programme. Five projects in total have been funded through previous calls, one in the Humanities, Biomedicine and Biotechnical sciences respectively and two in Technical sciences.

Young Researchers' Career Development Project – Training New Doctoral Students

Amount of funding for Programme in 2020

HRK 63.91 million

One of the Foundation’s strategic goals is funding career development of young researchers. Our objective is to fund between 200 and 250 new doctoral students every year, depending on the available funds from the State Budget, in order to reach the intended number of 1,000 doctoral students in the Foundation's grant system.

Figure 13. Number of doctoral students funded in 2020 broken down by institutions

The programme provides stable funding for young researchers’ career development and enables mentors to include research-oriented doctoral students into their projects, thus directing their careers toward excellent science. The ultimate goal of these calls is to educate new PhDs, who would pursue a career in competitive research or industry. Funding includes doctoral students' annual gross salary, including commute costs and other social benefits for employees. Applicants to the Call are mentor candidates – scientists permanently employed at Croatian scientific institutions who are Principal Investigators or team members of scientific projects funded by HRZZ, EU and other competitive sources. One generation of young researchers is funded from the European

Social Fund (ESF) within the Operational Programme 10.II.3. Improving Conditions for Croatian Researchers with co-financing from the State Budget of the Republic of Croatia, while other generations are funded exclusively from the State Budget. The monitoring procedure entails the evaluation of doctoral students' progress reports. In accordance with the terms and conditions of the Call and their contractual obligations, mentors and doctoral students are obliged to submit periodic reports on the doctoral student's progress after 18 and 36 months respectively. Doctoral students' progress reports are an essential source of information to the Foundation regarding the doctoral student's progress, their achievements in both their doctoral studies and their research within the mentor's project. In 2020, we monitored 663 doctoral students – 505 doctoral students were funded from the State Budget and 158 from the European Social Fund. The total cost of doctoral students' salaries in 2020 amounted to HRK 63,911,469.42 (HRK 43,203,770.79 from the State Budget and HRK 20,707,698.63 from ESF). The monitoring procedure included 33 evaluators, who evaluated 295 reports in 2020. In 2020, 66 doctoral students obtained their doctoral degree – 61 funded from budgetary funds and 5 funded through the ESF.

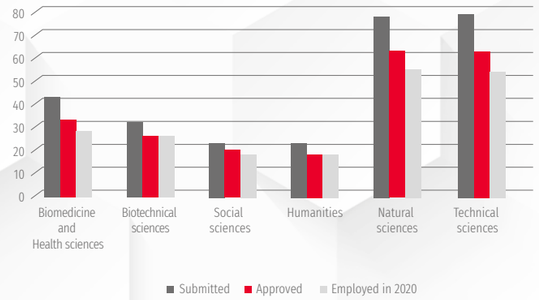


Figure 14. Statistics for the Call DOK-2020-01

January 2020 was the closing date of the Call DOK-01-2020. A total of 276 project proposals were submitted, the majority of them in Technical sciences (29%) and Natural sciences (28%). The evaluation procedure included 57 Croatian scientists involved in the work of 16 evaluation committees. 222 mentor applications were approved for funding. 198 doctoral students started working in 2020. The remaining number will be employed in early 2021.

Doctoral students
in numbers

198 NEW DOCTORAL STUDENTS RECRUITED

663 DOCTORAL STUDENTS MONITORED

66 DOCTORAL THESES DEFENDED

OVER **60** THESIS TOPICS DEFENDED

MORE THAN **600** PUBLISHED JOURNAL PAPERS

MORE THAN **400** PAPERS PUBLISHED IN Q1/Q2/A1 JOURNALS

MORE THAN **300** OF OTHER TYPES OF PUBLICATIONS

MORE THAN **350** PUBLICATIONS WITH DOCTORAL STUDENTS LISTED AS THE FIRST OR ONLY AUTHOR

OVER **500** CONFERENCES ATTENDED

OVER **250** TRAININGS

2 STATE PRIZES FOR SCIENCE

2 SCHOLARSHIPS "FOR WOMEN IN SCIENCE"

1 PATENT APPLICATION

OVER **30** AWARDS, MEDALS OR RECOGNITIONS GIVEN BY INSTITUTIONS OR PROFESSIONAL ASSOCIATIONS

International programmes

International
Programmes

2020 saw a major expansion of the Foundation's international programmes, most notably the Cooperation Programme with Croatian Scientists in Diaspora and the Swiss-Croatian Cooperation Programme. In 2020, the Foundation initiated various other activities aimed at supporting collaborative scientific projects and the inclusion of Croatian scientists and institutions into the European Research Area through the new Weave cooperation mechanism and programmes co-funded from the European Framework Programme (ERA-NET Cofund projects).

Weave is an instrument whose intention is to simplify the application and selection procedure for joint project proposals which are submitted jointly by researchers from not more than three European countries or regions by conducting a single evaluation procedure. Weave is not a new, separate funding programme; project proposals are rather submitted to existing national or regional funding programmes. The instrument follows the Lead Agency procedure. At the Croatian Science Foundation, Weave is implemented through the Research Projects programme. Weave enables researchers from two or more countries to submit a joint research project proposal to one of the funding agencies (the Lead Agency). This agency conducts the evaluation procedure according to its internal procedures. The funding recommendation is then forwarded to the other organizations (partner agencies) for their approval, without additional evaluation, pursuant to the Agreement on mutual recognition of evaluation procedures. This instrument is a sequel to the bilateral cooperation programme launched between HRZZ and the Slovenian Research Agency (ARRS) in 2019 and the Swiss National Science Foundation (SNSF) in 2020. By 2025, we expect to expand our collaboration to other national European research funding organizations which are part of the Weave initiative.

Apart from intra-European collaboration, in 2020 the Foundation also took part in the preparation of a new call by the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP), the network of research funding organizations from Europe and the Americas. In April 2021, this Platform will launch a thematic Call related to the recovery of society in the post-pandemic period.

"WE EXPRESS OUR FULL SUPPORT TO THE WEAVE INITIATIVE AND ITS EFFORTS TO ENCOURAGE BILATERAL AND TRILATERAL SCIENTIFIC COLLABORATION IN EUROPE...

...INNOVATIVE PROJECTS SUCH AS WEAVE SUBSTANTIALLY CONTRIBUTE TO STRONGER COLLABORATIONS BETWEEN SCIENTISTS AND MAKING THE IDEA OF THE EUROPEAN RESEARCH AREA A REALITY".

Lidia Borrell-Damián,
Science Europe Secretary-General

CROATIAN-SWISS RESEARCH PROGRAMME (CSRP)

Amount of funding for Programme in 2020
HRK 1.32 million

The Croatian-Swiss Research Programme is implemented by the Croatian Science Foundation in collaboration with the Swiss National Science Foundation. This programme funds 11 joint research projects implemented by Croatian and Swiss scientists in collaboration. A total of **HRK 1,316,600.75** was disbursed for their implementation in 2020.

17 young researchers and 3 expert associates were recruited on these projects so far. The largest number of projects are funded in the Natural sciences (54.55%) and Biomedicine and Health sciences (27.2%), while the institution implementing the largest number of projects is the University of Zagreb Faculty of Science, which hosts 5 projects. The results of Croatian-Swiss projects in 2020 include 14 publications, 12 of which were published in international journals; Principal Investigators attended 13 conferences and established 36 new collaborations.

PROMOTING EXCELLENCE IN HIGHER EDUCATION (TTP)

Amount of funding for Programme in 2020
HRK 4.23 million

The Tenure Track Pilot Programme represents joint cooperation of the Croatian Science Foundation, Ministry of Science and Education and École polytechnique fédérale de Lausanne (EPFL), for the preparation of the tenure track model for the development of careers of excellent young researchers in Croatia. The goal of the programme is to offer young and talented researchers the possibility of long-term career in Croatia.

Three research groups are funded in the framework of the Programme for a five-year period. Two projects are implemented at the Ruđer Bošković Institute, one is implemented at the University of Zagreb Faculty of Science.

The projects received **HRK 4,229,170.5**0 in 2020. Eight young researchers have been recruited to work on the projects so far and the following results were achieved: 7 papers published in international papers, PIs attended 7 conferences and established 8 new informal collaborations.

In late 2020, we launched the Call for the Extension of Project Activities within TTPP, which will enable funding of additional activities whose aim is to increase project quality and the results of research teams (e.g., recruiting additional members of the project team, short-term visits to mentors at EPFL, fees for accessing advanced infrastructure in Switzerland or other countries, further trainings for team members etc. plus additional overheads for their host institutions). These additional funds will be contracted in 2021.

COOPERATION PROGRAMME WITH CROATIAN SCIENTISTS IN DIASPORA "RESEARCH COOPERABILITY"

Amount of funding for Programme in 2020
HRK 1.61 million

The Research Cooperability Programme is financed from the European Social Fund as part of Specific Objective 10.ii.3. Improving the environment for Croatian researchers within the Operational Programme Efficient Human Resources 2014-2020 and co-funded from the State Budget of the Republic of Croatia.

The aim of the Programme is transfer of knowledge and attracting investments into the Croatian science and technology system, and indirectly into the economy as well, through collaboration between Croatian-based scientists and scientists of Croatian origin who live and work abroad. Such collaboration would enhance the collaboration and networking potential of Croatian scientists in Croatia and the diaspora, with special emphasis on career development of young researchers. Furthermore, it should enhance the competencies of Croatian scientists for their participation in international calls.

Scientific projects funded through this Programme are expected to be implemented by 31 May 2023 at the latest, with the obligation to recruit two full-time young researchers per project. Individual funding will be provided in the minimum amount of HRK 1,000,000.00 and HRK 2,200,000.00 maximum.

The Research Cooperability Programme currently funds 23 projects which received a total of HRK 1,614,420.82 in funding in 2020. 29 young researchers and 6 post-doctoral researchers have been recruited to these projects so far.

The highest number of projects are funded at the University of Zagreb (12) and Ruđer Bošković Institute (5). The largest number of projects are implemented in Biomedicine and Health sciences (17.39%), Biotechnical sciences and Social sciences (8.69% each).

ERA-NET PROGRAMMES

The European Union supports the coordination of national research programmes at the European level through ERA-NET programmes with participation of national research funding organizations (RFO). The consortium of national RFOs taking part in an ERA-NET launches calls for transnational research projects which enable researchers from various countries to implement joint research projects. The European Commission, through the Horizon 2020 programme, co-funds these projects in the amount of up to 33% through the instrument recently renamed to ERA-NET COFUND. The Croatian Science Foundation takes part in three ERA-NET consortia: BlueBio (ERA-NET Cofund on Blue Bioeconomy – Unlocking the potential of aquatic bioresources), Quantera (ERA-NET Cofund in Quantum Technologies) and Chanse (Collaboration of Humanities and Social Sciences in Europe).

The BlueBio Network (ERA-NET Cofund in Blue Bioeconomy) gathers 28 partners from 17 European countries (Belgium, Denmark, Estonia, Finland, Croatia, Germany, Greece, Ireland, Iceland, Italy, Malta, Norway, Portugal, Romania, Spain and Sweden), whose objective is to secure sustainable and competitive blue economy in Europe, to develop knowledge on value chains in blue bioeconomy, to encourage the application of research results, innovations and demonstrations of bioproducts in production through a multi-shareholder approach. The BlueBio Project shall contribute to the production of safe, nutritious and quality bioproducts and services. In 2020, the BlueBio network launched an additional call – BlueBio 2020, which received 17 pre-proposals requesting funding in the amount of EUR 17.4 million. After the first evaluation round, 16 teams were invited to submit full proposals. By the Call deadline, 15 full proposals were submitted requesting EUR 16.5 million in funding (with EUR 3.2 million of own funds). These proposals include one Croatian PI. Results of the Call will be published in late May 2021.

The QuantERA network was launched in 2016 and is currently the leading European network of public RFOs in the field of quantum technologies. The network gathers 38 organizations from 31 countries. The network secured over EUR 40 million of national contributions and additional EUR 15 million of European Commission co-financing for its new programme, QuantERA II. In early 2020, QuantERA II will launch a transnational call with European Commission co-financing, conduct an impact assessment and monitoring of funded projects, do a mapping exercise of public policies in the area of QT funding in QuantERA member countries and promote dialogue with the European Commission's QT Flagship Programme in order to ensure maximum complementarity of the two programmes.

The **HERA-NORFACE ERA-NET CO-FUND (Humanities in the European Research Area and New Opportunities for Research Funding Agency Cooperation in Europe** consortium comprises 27 organizations for funding research in the Social sciences and Humanities from 24 European countries. When applying for additional European Commission funding through Horizon 2020, this ERA-NET programme has been renamed to CHANSE. The consortium secured over EUR 26 million of national contributions and additional EUR 10 million of European Commission co-financing. A joint call for proposals is set to be launched in March 2021.

SUPPORT TO RESEARCHERS FOR APPLYING TO EUROPEAN RESEARCH COUNCIL PROGRAMMES

This Programme supports Croatian researchers (Visiting Researcher) in setting up collaboration with Principal Investigators of European Research Council (ERC) projects with the aim of gaining experience and preparing their own proposal for ERC calls.
In September 2019, the Foundation published its fourth Call "Support to Researchers for Applying to ERC programmes". Two applications were submitted, and funds were awarded to both researchers, one in the interdisciplinary area of science, and the other in Technical sciences. Only one of the two planned visits was implemented in full as the second researcher cancelled the visit due to the COVID-19 pandemic.

Amount of funding for Programme in 2020

HRK 30,083.28

2020
in numbers

540
PROJECT PROPOSALS EVALUATED

867
CROATIAN PANEL MEMBERS AND INTERNATIONAL PEER REVIEWERS INCLUDED IN PROJECT PROPOSAL EVALUATION

167
NEW PROJECTS ACCEPTED FOR FUNDING

713
PROJECTS MONITORED

601
EVALUATORS AND INDEPENDENT EXPERTS INVOLVED IN PROJECT MONITORING

4974
PRINCIPAL INVESTIGATORS AND TEAM MEMBERS

873
YOUNG RESEARCHERS FUNDED

66
DOCTORAL DISSERTATIONS COMPLETED

113
DOCTORAL/MASTER/ GRADUATION THESES

147
CONFERENCE ABSTRACTS

37
COLLECTIONS OF PAPERS

36
BOOK CHAPTERS AND BOOKS

525
PAPERS IN ACADEMIC JOURNALS

3
PATENTS

Research stories

Assessment and rehabilitation of existing structures

PROJECT TITLE:
Assessment and rehabilitation of existing structures – Development of contemporary methods for masonry and timber structures (ARES)

PROGRAMME:
Installation Research Projects, Call 2019-04

PRINCIPAL INVESTIGATOR:
Assistant Professor Mislav Stepinac, Ph.D.

INSTITUTION:
University of Zagreb, Faculty of Civil Engineering

PROJECT IMPLEMENTATION PERIOD:
January 2020 – January 2025

SCIENTIFIC AREA:
Technical sciences

More than 75% of Croatian buildings are over 30 years old, which represents a time when, for most buildings, reconstruction or renovation is necessary. More than 40% of buildings are over 50 years old (most were built by masonry and wood), which would mean that the useful life of these buildings has already expired. Currently, the assessment of the condition of existing structures is based on identifying, localising and assessing deterioration, degradation and damage. The findings of the condition assessment usually suggest the reinforcement of structures. Current practice cannot be considered appropriate for making a safe decision on the reliability of structures.
Simplifications in existing design methods allow engineers to conduct structural safety assessment for most structures. Deterministic methods for evaluating existing structures enable easy assessment but suffer from high safety factors. Assessing the condition of existing structures requires more advanced methods such as semi-probabilistic, probabilistic or risk-based methods, which have not yet been used in masonry or timber structures. When assessing the condition at the level of structure reliability, collapse and unnecessary demolition are avoided and the end result are safer structures and better use of resources. The lack of standardised assessment procedures results in inadequate reconstruction of existing structures. Without proper recommendations, it is difficult to approach the problem, which usually leads to misinterpretation of the collected data and wrong conclusions and decisions related to strengthening and reconstruction of existing structures. The development of research techniques for determining material properties will help reduce unreliability related to predicting behaviour of existing structures.

The project will deal with the existing masonry and timber structures in order to determine the advantages of assessing their condition in terms of economy and safety of structures. Main objectives of the project are: to develop a database of structures and assessment techniques, to gain insight into the properties of materials and structures by using the methods of condition assessment and analysis of structures, to create a probabilistic database of material characteristics for masonry and timber structures, to evaluate characteristics of materials and their behaviour over time for analysing existing structures, to optimize prediction models for behaviour of structures and to assess the proportionality and reliability of design guidelines.

This research is particularly interesting in terms of earthquakes because masonry structures are the most sensitive to horizontal loads. The assessment of the condition of existing masonry structures requires knowledge of various and specialised technical skills, and the objective of this project is to develop advanced methodology for a more precise condition assessment complemented by modern procedures (Bayesian updating, value of information analysis) and thus contribute to the profession and science in connection with the earthquake that recently hit Zagreb. The project partner is the University of Chalmers from Sweden with active participation of four other European universities.

Research stories

Multilevel approach to spoken discourse in language development

PROJECT TITLE:
Multilevel approach to spoken discourse in language development – MultiDis

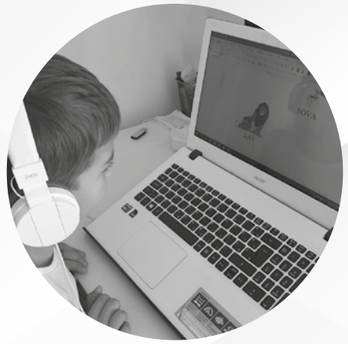
PROGRAMME:
Installation Research Projects, Call 2017-05

PRINCIPAL INVESTIGATOR:
Assistant Professor Gordana Hržica, Ph.D.

INSTITUTION:
University of Zagreb, Faculty of Education and Rehabilitation Sciences

PROJECT IMPLEMENTATION PERIOD:
1 January 2018 – 31 December 2022

SCIENTIFIC AREA:
Social sciences



This project studies speech discourse primarily of older children with different linguistic knowledge (controlled by language tests) and with different courses of language adoption (monolingual and bilingual speakers, different socio-economic status, orderly and disturbed language development). The project is based on a multi-level approach in discourse analysis (Frederiksen et al. 1990), which starts from Jakobson's idea that language levels are interconnected and that interrelations between different parts of the whole must necessarily be taken into account. Unlike discourse approaches that emphasise only one of the processing levels as key, the multi-level approach follows the emergence of super-sentential units on the local (syntax, morphological and lexical characteristics) and on the global level (general discourse structure). This approach best reflects the multifactorial nature of the discourse. On the other hand, the orientation towards several levels of analysis is particularly demanding.

Each of the levels defined in the multi-level approach and the measures used for its assessment are language specific. For example, conjunctions (at the level of sentence and discourse) differ from language to language as well as morphological labelling forms, syntax structures, etc. A multilevel approach has so far been rarely used in language acquisition surveys, that is, in studies that would identify and describe the gradual adoption of language knowledge needed to produce discourse at each level. The area of studying the structure of discourse, discourse in language development and assessing discourse has not been investigated to a large extent.

This is particularly true considering that most theories, approaches and measures are based on English and, just like other approaches to language acquisition that have been modified and based on new data from other languages, require validation with data from typologically different languages. Therefore, a comprehensive study of the speech discourse of different populations contributes to the development of an under-researched area, the application of the model to a different population and the adaptation of methods of analysis (for example, different language measures) to the Croatian language.

PROJECT OBJECTIVES:

1. describe the development of discourse of older monolingual and bilingual children at multiple language levels
2. adjust and apply discourse evaluation measures developed for other languages (primarily English) in Croatian
3. develop or complement existing publicly available language resources (spoken language corpora) suitable for language research.

Research is based on the analysis of language patterns (recordings that have been transcribed), both existing ones (e.g. Croatian Corpus of Spoken Language) or developed within the project (Croatian Narrative Corpus – Frog story and Croatian Narrative Corpus MAIN, Corpus of Bilingual Italian and Croatian Speakers (under construction) using specialized computer programs.

On the basis of current findings and research conducted during the first part of the project, a computer application will be created which will serve for targeted and structured stimulation of discourse production and analysis of language samples, guided by a multi-level approach to discourse. Analysis procedures and measures are developed for the application and can be used as a means of assessing language knowledge.

Frequency Dictionary of Croatian Child Language will be developed, containing a list of words and morphological forms that appear in the adoption of Croatian by the third year of life. A prerequisite for the implementation of this project is an interdisciplinary research group from various scientific institutions throughout Croatia and outside Croatia, with special emphasis on the education of young doctoral students.

Research stories

Influence of Summer Fire on Soil and Water Quality

PROJECT TITLE:
Influence of Summer Fire on Soil and Water Quality

PROGRAMME:
Research Projects, Call 2018-01

PRINCIPAL INVESTIGATOR:
Professor Ivica Kisić, Ph.D.

INSTITUTION:
University of Zagreb, Faculty of Agriculture

PROJECT IMPLEMENTATION PERIOD:
1 December 2018 – 30 November 2022

SCIENTIFIC AREA:
Biotechnical sciences

Open space fires represent a natural disaster for the entire territory of the Republic of Croatia, especially for its Mediterranean part. In the Mediterranean area, the risk of occurrence of fire increases due to depopulation of rural areas and abandonment of agricultural areas. As a measure of removing plant mass from the remaining agricultural areas, this mass is often incinerated.

Unfortunately, sometimes this incineration causes open space fires. One of the biggest consequences of open fires is the increase of erosion processes, which cause reduction of soil quality, water pollution, increase of greenhouse gas emissions, and reduction of biodiversity. Multi-year research on soil and water processes in post-fire period have not been sufficiently conducted on the territory of the Republic of Croatia. Through this research project, research on erosion processes and the impact of fire on soil and water quality are conducted at several locations in Mediterranean Croatia.

Mulching is a measure included in post-fire rehabilitation which has proven effective in preventing soil degradation. The research will reveal the most appropriate agro-technical interventions to reduce soil degradation in post-fire period, the degree of negative effect of fire on physical, chemical and hydrological features of soil, and the time variability of soil properties in the post-fire period. The link between drainage, erosion and nutrient loss on the affected areas will be determined in relation to precipitation characteristics and burning intensity. Also, the time period for the return of vegetation to the affected area will be determined in relation to different burning intensities. What potential organic and inorganic pollution by water erosion could end up in surface waters, how fires degrade soil, and to what extent mulch leads to an increase in soil quality are key assumptions of this research.

Research stories

Life on the Roman road

NAZIV PROJEKTA:
LIFE ON THE ROMAN ROAD: communications, trade and identities on Roman roads in Croatia from 1st – 8th century

NATJEČAJNI ROK:
Installation Research Projects, Call 2017-05

VODITELJ PROJEKTA:
Dr Ivana Ožanić Roguljić, Ph.D.

USTANOVA:
Institute of Archaeology

TRAJANJE PROJEKTA:
01 January 2018 – 31 December 2022

ZNANSTVENO PODRUČJE:
Humanities

During the Roman era, roads were the arteries of the Empire itself: connecting provinces and cities, being a key factor in conquests and stabilising Roman authority in the conquered areas and often serving as a template for modern road routes. Roman roads have created links around which life was organized and settlements were established in the period after the fall of the Empire.
The main goal of the project is the interpretation of everyday life on the Roman road, from the beginning of Roman rule to the period of the fall, accumulation and integration of new identities. This project offers an opportunity for a new perspective: how does life develop around Roman roads and paths during the main use of roads and after it has ended?

Life along the roads continues even after the classical era of Roman rule has passed, while former Roman provinces inhabit nations of different backgrounds and origins: the Roman culture in a changed form – strongly adapted to new historical circumstances and processes – is still alive thanks to the people and communities supporting the Roman identity as their own, while the formation of a medieval material culture borne by the new populations located in former Roman provinces is under strong influence of Roman cultural traditions, albeit in somewhat changed form, adapted to new circumstances.
Both perspectives, everyday life along Roman roads during the Roman rule and everyday life on the Roman road in the post-Roman world, are represented in research activities of the project:

- Research activities focused on the localities of Žuta Lokva, Lika and the Cibalae-Mursa route, Eastern Slavonia will study the definition of details of everyday life (nutrition, dishes, environment) along the roads in the Roman period
- Research activities focused on 3 Avarian sites in the vicinity of Cibala, Eastern Slavonia will study the life of direct heirs and indirect followers of Roman culture in the post-Roman world.

By analysing archaeological material, field inspections and interdisciplinary approach to archaeological research, the project will attempt to show how life on the Roman road was organized and will follow the development and collapse of the Roman lifestyle. The broad perspective of the project will be the starting point for a large

number of future comparisons, research and projects that will enable the research group to participate equally in current topics, debates and research in European archaeology.

Six associates are working on the project alongside the Principal Investigator, two of which are doctoral students. So far, we have presented at a large number of conferences, published works, held popularization lectures and workshops from both spheres of the project (Roman and medieval). In addition, thematic seminars for doctoral candidates, round tables and scientific gatherings are organized within the project.

Research stories

Loggerhad sea turtle microbiome

Sea turtles are charismatic sea animals that are very sensitive to human impact in marine ecosystems and are therefore some of the most endangered species in the world. Turtles are known for their solid armour, whose upper part carries a complex community of epibionts such as macroalgae and invertebrates. Some epibionts need an animal base to attach and develop so they have become exclusively epizoic and fully dependent on their hosts. Nowadays we know that sea turtles carry unique and numerous communities of diatoms (silica algae), which represent one of the most important groups of photosynthetic microorganisms present in almost all aquatic habitats, while other groups of microorganisms are less explored. Despite the importance and fundamental role of microorganisms in physiological processes of sea turtles, data on epibiontic bacteria are completely missing, while the composition of bacterial communities in their digestive system is only sporadically described.

The scientific contribution of the TurtleBIOME project is to provide a clear, complete and detailed picture of microbiological composition of surface biofilm and microbiome of the loggerhead turtle inhabiting the Mediterranean Sea. In our research, we combine research of epizoic communities of prokaryotes and eucaryotes with traditional methods (monoclonal laboratory cultures, use of light and electronic microscopes). Two doctoral students and one postdoctoral researcher are involved in the project. We are working on the analysis of samples collected from approximately 200 turtles in cooperation with various colleagues engaged in the protection and recovery of the loggerhead turtles in the Mediterranean.

In previous stages of the project, 10 scientific papers were published, describing as many as 13 new types of epizoic diatoms, and we participated in scientific conferences with 26 summaries. We were also active in the popularization of science – as part of the Biology Night event at the Faculty of Science, we organized the Glass World of Turtles workshop in cooperation with artists from the Academy of Fine Arts from Zagreb, and we participated in the European Researchers' Night with the workshop organized by the Croatian Science Foundation. All details about our work can be found on our website and followed via social networks (Facebook, Twitter, Instagram) of the TurtleBIOME project.

PROJECT TITLE:
Loggerhead sea turtle (Caretta caretta) microbiome: insight into endozoic and epizoic communities

PROGRAMME:
Installation Research Projects, Call 2017-05

PRINCIPAL INVESTIGATOR:
Assistant Professor Sunčica Bosak, Ph.D.

INSTITUTION:
University of Zagreb, Faculty of Science

PROJECT IMPLEMENTATION PERIOD:
01 March 2018 – 28 February 2023

SCIENTIFIC AREA:
Natural sciences

Research stories

Professionalism in Health

PROJECT TITLE:
Professionalism in Health: Decision Making in Practice and Research – ProDem

PROGRAMME:
Research projects, Call 2019-04

PRINCIPAL INVESTIGATOR:
Professor Ana Marušić, Ph.D.

INSTITUTION:
University of Split School of Medicine

PROJECT IMPLEMENTATION PERIOD:
01 January 2020 – 31 December 2023

SCIENTIFIC AREA:
Biomedicine and Health sciences

The ProDem project deals with researching decisions in health care, both in practice and in science. In studying decisions taken in health care, especially in practice, we have focused on tools that help develop and apply guidelines for clinical practice. We published a paper in the Journal of General Internal Medicine (impact factor: 4,606). This study contains the first-ever comparison of two guidelines for reporting clinical guidelines, RIGHT and AGREE Reporting, which were treated as two diagnostic tools. We compared their content and analysed the language in which they were written. Then we applied them to a set of Croatian and European clinical guidelines, to see if their assessment of the published clinical guidelines is similar. RIGHT and AGREE Reporting cover similar content, but despite that, almost one third of particles in the RIGHT list do not cover the content of the AGREE Reporting List. In the opposite direction, this is the case with 11% of the particles. RIGHT and AGREE Reporting have a high correlation in assessing the published guidelines, but clinical guidelines have largely met the RIGHT requirements, which may indicate that RIGHT covers a wider range of problems relevant for contemporary guidelines. AGREE Reporting tool is more suitable for authors of clinical guidelines, while RIGHT could be more appropriate for readers and end users of clinical guidelines. In further research, we will examine the language of recommendations in clinical guidelines and how it can influence decision making and safety in this process.

In the study of decisions taken in science, we focused on studying decision-making in the review procedure in journals and during the evaluation of scientific projects. In cooperation with a research group from the University of Valencia (Spain), we investigated the features of the review procedure on a sample of almost one million reviews in journals published by Elsevier. The paper describing this research was published in eLife journal (impact factor: 6.830). The peer review procedure is an important part of the process of publishing scientific work, because it makes written research undergo additional control by independent experts in the field in which the research was conducted. Since the decision whether a paper will be published or not is made based on the review procedure, it is important for editors and authors to assess whether the reviewer's decision regarding the quality of a scientific article has been taken objectively. If the review reports differed according to characteristics of the reviewers that have no direct link with the assessment of the quality of the article, there would be a chance that the decision was made in a biased manner. In order to assess whether there is a difference in the texts of the review reports, we analysed about half a million reports using different programs that analyse the text according to the number of words and percentages of words related to objectivity, positive emotions and morality. The analysis showed that texts were mostly written using a high percentage of words related to objectivity, and low use of words related to morality. The percentage of words related to positive emotions differed in view of the reviewers' decision on the quality of the article.

The highest percentage was used in cases where the reviewer considered that the paper was of high quality and should be published. This percentage decreased with the amount of additional work needed in order to improve the paper. The lowest level of words associated with positive emotions is present in cases where the reviewer decided to reject the paper. Our research, although limited to text analysis only, shows that the review reports are written in objective style, and that a review decision, and not factors such as gender or scientific discipline, affect the style of writing. Further research will focus on using a machine learning approach in places where the process can be automated so that algorithms would make a decision based on written reports.

Young researchers

In this section we present young researchers recruited through the Young Researchers' Career Development Project who defended their doctoral theses in 2020

Young researchers

Dr **Ema Vrbanović**, Ph.D, M.D.

DOCTORAL STUDENT:
Dr Ema Vrbanović, Ph.D, M.D.

DISSERTATION TITLE:
Values of salivary markers of oxidative stress in subjects with temporomandibular disorders

MENTOR:
Professor Iva Alajbeg, Ph.D., M.D.

INSTITUTION:
University of Zagreb, School of Dental Medicine

CALL:
DOK-2018-01

Temporomandibular disorders (TMP) are the most common orofacial painful disorders of non-dental origin and unexplained aetiology. They are recognized for their characteristic symptoms: pain in the masticating muscles and/or temporomandibular joint, decrease in the range of lower jaw movements and sounds coming from the joint. Micro and macro trauma, female gender, some systemic diseases, influence of mechanical, chemical and environmental stressors are reported as predisposing factors of these disorders.

Recent studies correlate variations in oxidative status and severity of TMP symptoms. This two-part clinical study is conducted with the aim of establishing the association of the TMP with oxidative stress markers (OS) and cortisol. In the first part of the study, set up as case-and-control research, the aim is to isolate and quantify OS markers and cortisol in patients with chronic TMP and compare them with a healthy control group. In the second part of the study, set up as a randomised clinical trial, salivary markers of OS and treatment outcomes in patients with TMP are monitored for 6 months.

Patients were randomly assigned to two treatment groups. Due to the unknown aetiology of TMP, their treatment is based on methods that are intended to relieve the symptoms without knowing how they work. This study aims to investigate the function of OS mechanisms in TMP and to assess whether this mechanism would be an objective in the treatment procedure. The results of the investigation could potentially correlate the intensity of symptoms with the concentration of OS and cortisol markers in saliva and provide the opportunity for objective measurement and monitoring.

Young researchers

Dr **Katarina Lukšić**, Ph.D.

Wild grapevine (*Vitis vinifera subsp. sylvestris*) is related to cultivated vine. Its habitats are endangered and its genetic potential neglected. Morphological and genetic properties and the role of wild vine in the formation of the Croatian grape variety are largely unknown. With the ever-increasing impact of climate change and genetic erosion of vines, by researching wild vine we aim to improve breeding programmes in order to achieve disease resistance as well as to preserve the diversity of vines. Systematic research of the wild grapevine population in Croatia has not been conducted so far. The research aims are to determine the genetic variability of the wild vine, to assess the possible contribution of wild vine in the creation of some indigenous Croatian varieties and to determine the differences of economically important characteristics between wild vines and cultivated vines. Modern molecular techniques, microsatellites (SSR) and computer programs will be used to reconstruct the parentage of the wild vine and assess the gene flow between the wild and cultivated vine.

The research of the wild vine is conducted at sever natural habitats of the wild vine, a collection of F1 wild grapevine seeds and an ex situ collection of cultivated vines of the Institute for Adriatic Crops and Karst Melioration in Split. Morphological identification is performed through the OIV (Organisation Internationale de la vigne et du vin) descriptors, and genetic identification through 20 SSR markers and specific SSR markers for: resistance to fungal diseases, flower sex and chloroplastic SSR markers. This research will determine the genotypic structure and diversity of Croatian wild grapevine populations. Data on the value of economically important characteristics of the wild vine that could be important for creating new varieties will be presented. We expect to establish morphological and molecular characteristics for identification for the purpose of efficient management of genetic resources and protection of wild grapevine biodiversity.

DOCTORAL STUDENT:
Dr Katarina Lukšić, Ph.D.

DISSERTATION TITLE:
Morphological and genetic variety of wild grapevine (Vitis vinifera subsp. sylvestris Gmel Hegi) in Croatia

MENTOR:
Assistant Professor Goran Zdunić, Ph.D.

INSTITUTION:
Institute for Adriatic Crops and Karst Reclamation, Split

CALL:
DOK-2015-10

Young researchers

Dr **Branko Stanić**, Ph.D.

DOCTORAL STUDENT:
Dr Branko Stanić, Ph.D.

DISSERTATION TITLE:
Determinants of budget transparency of Croatian municipalities

MENTOR:
Dr Katarina Ott, Ph.D.

INSTITUTION:
Institute of Public Finance

CALL:
Call: DOK-2015-10

The main research objective of the doctoral student is to classify the existing theoretical approaches in the analysis of budget transparency with a special emphasis on the online budget transparency of local units and to empirically establish basic determinants of online budget transparency of Croatian municipalities. Scientific goals include theoretical systematization of previous knowledge in the field of budget transparency, empirical testing, modelling and analysis of the influence of economic, legal and political factors on budget transparency of Croatian municipalities, as well as an analysis of how different drivers of isomorphism (forced, normative and mimetic pressures) affect the level of municipal budget transparency. Budget transparency is measured by using the Open Local budget Index (OLBI), developed within the framework of the project. Hypotheses have been established in accordance with theory and previous empirical research, and it is expected that higher fiscal capacity of the municipality, political competition in local elections and the share of women in municipal councils contribute to higher levels of budget transparency.

We expect to show that the legislative regulation of budget reporting has a motivating effect on the overall municipal budgetary transparency. Finally, the influence of neighbouring municipalities is examined, expecting that their budget reporting practices would affect the observed municipality, pointing to mimetic isomorphism. Since the aim is to establish an optimal combination of determinants that increases local budget transparency, three methodological approaches will be used – the POISSON regression model, logistic regression and spatial regression analysis, with a single panel database. The applicative significance of the research is primarily considered from the point of view of recommendations to economic policymakers at the national level, but also to executive and representative authorities at the municipal level on which instruments to use to increase local budget transparency. Also, the implications of the results for potential reform of territorial and fiscal structure of the Republic of Croatia will be indicated.

Young researchers

Dr **Maja Milošević Carić**, Ph.D.

This dissertation presents the results of several years of (field) research into musical archival collections, stored in church, private and public institutions of two urban centres on the island of Hvar: the City of Hvar (the Capitol archive, the quire of the Franciscan monastery Church, the Hvar Heritage Museum, the private archive of the Machiedo family) and Stari Grad (Archive of the Dominican monastery, private archive of the Politeo family). Since the majority of musical sources located there have not been researched or recorded so far, the prerequisite for further analysis was physically arranging the material and preparing thematic catalogues of processed manuscripts and printed musicales, which are presented in tabular form in the dissertation.

Tables in the context of this dissertation have a dual function. On the one hand, they are the result of extensive work on organising and cataloguing music collections of Hvar and Stari Grad per se, which finally revealed the quantity and quality of spiritual and world art music nurtured in the history of two urban centres of the island in the period between the 17th and the beginning of the 20th century. On the other hand, they served as the basic starting point and key reference for the first part of the dissertation, that is, the chapter providing an analytical overview of the structure and content of Hvar and Stari Grad music collections, as a step further in the illumination of the former musical repertoire and the overall musical life on the island. We attempted to interpret the data obtained from previously systematized music sources within the social, cultural and political context of the period to which they relate, in order to shed light on the artistic history of the island and to provide new insights into different layers of music existence (within church rites and within the secular framework), active musicians (composers, chaplains, performers), practices of private and public music performance and the available repertoire and established forms of music.

DOCTORAL STUDENT:
Dr Maja Milošević Carić, Ph.D.

DISSERTATION TITLE:
Art music on the island of Hvar between 17th and early 20th century

MENTOR:
Dr Vjera Katalinić, Ph.D.

INSTITUTION:
Croatian Academy of Sciences and Arts

CALL:
DDOK-2014-06

Young researchers

Dr **Lidija Kanižaj**, Ph.D.

DOCTORAL STUDENT:
Dr Lidija Kanižaj, Ph.D.

DISSERTATION TITLE:
Characteristics of homo- and heterometallic complex compounds derived from tr(oxalate) and tri(chloranilate) building blocks

MENTOR:
Dr Marijana Jurić, Ph.D.

INSTITUTION:
Ruđer Bošković Institute

CALL:
DOK-2015-10

The design and synthesis of new materials based on polynuclear compounds of transition metals, which show desirable and predictable physical properties (mechanical, optical, electrical or magnetic), represent a long-lasting scientific and research interest in order to obtain new functional materials on which modern technology is based. An important role in the design of polynuclear compounds is played by the oxalate group, $C_2O_4^{2-}$, due to its various possibilities of coordination on metal centres as well as its mediation in magnetic interaction. The oxalate group can be replaced by a larger ligand, also bridging, dianion 2,5-dihydroxy-1,4-benzocinone (H_2dhbq; $C_6H_4O_4$) or its derivatives ($C_6O_4X_2^{2-}$).

Lidija Kanižaj's dissertation will investigate new homo- and heterometal complexes prepared using anion mononuclear oxalate and chloranilate building blocks $[M(L)_3]^{3-}$ (M = Cr^{3+}, Fe^{3+}; L = $C_2O_4^{2-}$, $C_6O_4Cl_2^{2-}$), in reactions with copper salts (II), with the addition of N-aromatic ligands. In order to prepare materials with interesting (not only magnetic but also electrical) properties, semiquinone radicals will be introduced to the reactions. The aim of the proposed paper is to determine the impact of structural arrangement on the magnetic properties of new coordination systems, which should ultimately have the features of molecular magnets. Also, the presence of cooperative magnetic and electrical properties in the same inorganic-organic system should result in the development of electronically adjustable magnetic devices in the future.

The new heterometal complexes will also be investigated as precursors for the preparation of mixed metal oxides by thermal degradation. The new way of obtaining single-phase systems, apart from lower energy consumption, could serve for commercial acquisition of these technologically important materials, such as oxides with photocatalytic activity for obtaining hydrogen by splitting water, which is a promising solution to problems of energy crisis and environmental protection.

Young researchers

Dr **Petra Đurović**, Ph.D.

For the purpose of autonomous movement and manipulation of objects in unstructured environments of robots of affordable prices, we need to develop hardware solutions that involve robots without encoders controlled by RGB-D cameras. In addition, methods enabling the realisation of such requirements need to be developed and implemented.

Therefore, this doctoral thesis suggests the development of four new methods: visual servoing method for SCARA robots using RGB-D camera as the sole sensor; two methods for object classification; and method for determining correspondence between parts of objects of the same class. The methods that have been developed herein, integrated into one system, together with hardware parts – robotic hand and camera, make up a functional whole. Such a robotic system classifies the object on a scene filmed with the RGB-D camera, estimates its position and divides it into semantically meaningful units. It then determines the position and points in which the grip of the robot arm should be placed. Finally, the robot arm is steered by visual servoing and the gripping is performed.

The developed methods are experimentally evaluated by a series of experimental tests in which robots are guided over the desired position and are required to capture simple objects, by comparing the performance of object classification and determination of parts at reference sets of 3D objects and in-depth images with other reference methods, as well as by gripping experiments based on the estimated position of the object and the part intended for gripping.

DOCTORAL STUDENT:
Dr Petra Đurović, Ph.D.

DISSERTATION TITLE:
Classification of objects and determination of correspondence of parts within classes of objects for in-depth images for the purpose of robotic manipulation

MENTOR:
Professor Robert Cupec, Ph.D.

INSTITUTION:
Josip Juraj Strossmayer University in Osijek, Faculty of Electrical Engineering, Computer Science and Information Technology Osijek

CALL:
DOK-2015-10

The Foundation's activities and popularization of science

PHD CAFÉ

In early 2020, the Foundation launched a new activity intended for the promotion of young Croatian scientists funded through the "Young Researchers' Career Development Project – Training New Doctoral Students" – PhD Café. The idea behind these events is for doctoral students and other young scientists to get together in an informal environment. Each PhD Café features several doctoral students who present their research to their colleagues from other institutions and the general public.

In 2020, we held 8 such events, which featured presentations by 32 doctoral students. Four events were held in Zagreb, two in Osijek and one in Rijeka and Split respectively. Since these events are held in bars, the restrictions imposed due to the coronavirus pandemic made it impossible for additional PhD Cafés to be held on a more regular basis.

Once life returns to normal and restrictions related to public gatherings and the opening of bars are lifted, we plan to resume with this activity and held it once a month in Zagreb and several times a year in Split, Rijeka and Osijek and potentially other cities as well.

INSTALLATION RESEARCH PROJECTS PRESENTATION CEREMONY

On 9 March 2020, the Great Hall of the Croatian Academy of Sciences and Arts hosted the presentation ceremony for projects approved for funding through the Call UIP-2019-04. The "Installation Research Projects" Programme supports the establishment of new research groups of young scientists in order to accelerate the establishment of autonomous research careers after the acquisition of a doctoral degree. The Programme enables young scientists to set up their own research group and laboratory that would deal with innovative research topis during a five-year funding period.

The Call UIP-2019-04 was open from 28 January to 24 May 2019. Over 160 project proposals were submitted and, up to the date of the ceremony, 49 projects were contracted. It is important to note that this financial injection would open up 60 new positions for young researchers (doctoral students and post-doctoral researchers).

The audience was welcomed by the State Secretary at the Ministry of Science and Education, Dr Tome Antičić, PhD, followed by speeches by the HRZZ Board President, Professor Dario Vretenar, F.C.A. and Executive Director, Dr Irena Martinović Klarić PhD. After the introductory speeches, six young scientists selected on the basis of their research area briefly presented their new installation projects.

CONTRACT AWARD CEREMONY FOR CALL IP-CORONA-2020-04

On 10 July 2020, the National and University Library in Zagreb hosted the contract award ceremony for the Croatian Science Foundation's Call "Management of infectious diseases caused by coronaviruses and social and educational aspects of the pandemic" (IP-CORONA-20202-04).

Apart from the 11 Principal Investigators and heads of their institutions, the ceremony was attended by the Croatian Prime Minister Mr Andrej Plenković, Minister for Science and Education Professor Blaženka Divjak, Special Advisor to the Prime Minister Professor Zvonko Kusić, F.C.A., President of the Parliamentary Committee for Education, Science and Culture Dr Irena Petrijevčanin Vuksanović and HRZZ representatives headed by President of the Board Professor Dario Vretenar, F.C.A.

For epidemiological reasons, the event was closed for the general public.

COLLOQUIA OF THE CROATIAN ACADEMY OF SCIENCES AND ARTS AND THE CROATIAN SCIENCE FOUNDATION

After a two-year break, in 2020 the Foundation resumed with the series of lectures of senior Croatian scientists that is organised in cooperation with the Croatian Academy of Sciences and Arts – the so-called HAZU-HRZZ Colloquia. The Colloquia were launched in 2017 and took place in regular intervals until mid-2018. A total of 18 colloquia were held in this period.

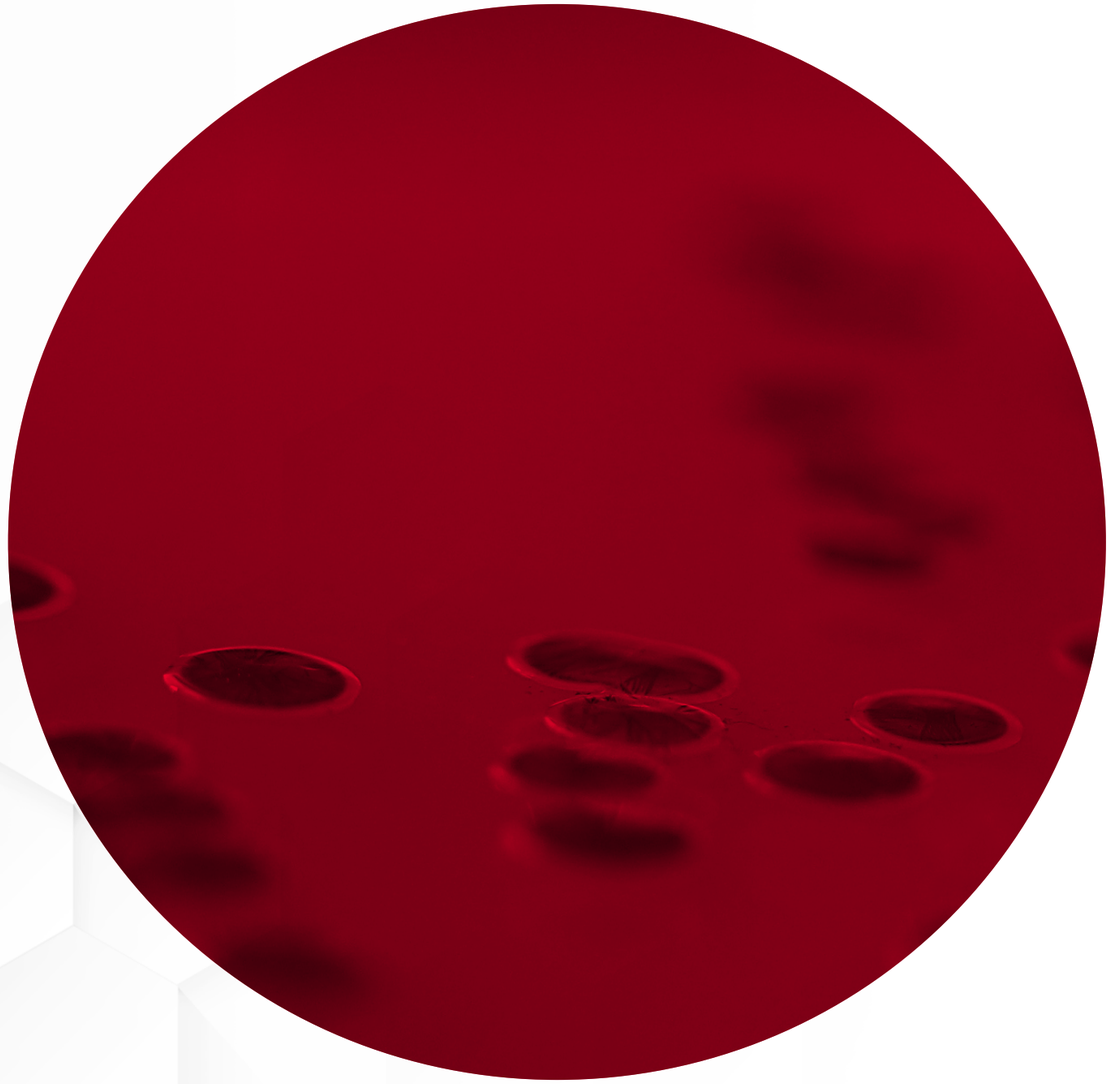
Colloquium no. 19 took place on 3 March 2020 at the Great Hall of the Croatian Academy of Sciences and Arts. Professor Goran Filipi, F.C.A., Head of the Institute for Linguistic Research at HAZU and Principal Investigator of project IP-2019-04-3688 "Linguistic Geography of Croatia in the European Context", held a lecture on the Istro-Romanian language.

The coronavirus pandemic prevented the jubilee 20th Colloquium to be held. When these exceptional circumstances are over, we plan to return to organising these lectures on a monthly basis.

NEW WEBSITE AND TWITTER

In April 2020, the Foundation launched an improved version of its website, featuring visually more attractive functions and modern web design tools. The new website retained the structure of the previously used website with brand new pages and segments introduced. Here we would particularly like to highlight the page “Science in the Spotlight”, where we present successful projects (“Research stories”), published papers and other accomplishments of our scientists (“Science news”) and their media appearances (“Interviews with scientists”). In addition, we dedicated a whole webpage to our young scientists – the page “Meet our young researchers” features stories presenting doctoral students recruited through the “Young Researchers' Career Development Project”. This page currently features over 100 current or former doctoral students funded by HRZZ.

In parallel to the new website, the Foundation also opened a profile on Twitter. We use Twitter to share information and all relevant content created by various scientific institutions and scientists. By the end of 2020, we collected over 250 followers. We hereby invite all scientists and other Twitter users to connect with us – find us as Croatian Science Foundation (@HRZZ_science).



Plan of activities in 2021

In 2021, the Foundation is planning to launch the following calls: Research Projects (IP), Installation Research Projects (UIP), Young Researchers' Career Development Project – Training New Doctoral Students (DOK), Young Researchers' Specialization Project – Post-doctoral Training (PDOK), Building Croatian Professional Terminology (STRUNA), Support to Researchers for Applying to ERC Programmes.

The Multilateral Cooperation Agreement and Weave initiative that the Foundation signed with research funding organizations from other European countries will make it possible for Croatian researchers to submit bilateral project proposals with their colleagues from Switzerland and Slovenia to SNSF's and ARRS' calls as well as bilateral and trilateral projects to HRZZ's "Research Projects" Call.

In addition to the QuantERA consortium, which we joined in 2019, the Foundation will join two additional consortia in 2021: ERA-NET Cofund on Blue Bioeconomy (BlueBio) and Chanse (Collaboration of Humanities and Social Sciences in Europe). In 2021, we also plan to take part in the Call for Proposals implemented by the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP). The Croatian Science Foundation will also continue to actively participate in two international associations – Science Europe and Global Research Council.

Since one of the Foundation's permanent missions is to enhance the activities it implements, in-depth evaluations and analyses will be conducted in 2021 as well. Evaluation of the Call IP/UIP-2019-04 will be implemented in 2021, which should lead to the development of new procedures and evaluation and reporting forms. We also plan to evaluate the success and impact rates of previous programmes and projects. Since the number of projects monitored through the EPP system is constantly on the rise, the system needs to be upgraded to a more modern version, which would facilitate navigation through the system. In 2021, the Foundation, upon receiving approval by the Ministry of Science and Education, plans to amend several of its fundamental acts, primarily the Statute and Ordinance on Internal Organization. In addition, the new Strategic Plan for the upcoming five-year period (2021-2025) should be adopted.

As of the upcoming Call for Research and Installation Research Projects, the Foundation plans to introduce the Data Management Plan (DMP) as part of mandatory application documents.

We plan to resume the series of lectures organised in cooperation with the Croatian Academy of Sciences and Arts (HAZU-HRZZ Colloquia), at which senior Croatian scientists present their research and projects. We also plan to continue with the promotional activity aimed at young researchers – PhD Café. This activity is used for promoting future PhDs funded through the "Young Researchers' Career Development Project". We also plan to launch an additional activity intended for young researchers – Career Path seminars, organised in collaboration with the Association of Croatia-American Professionals (ACAP). This activity will be held in virtual form and will feature Croatian scientists living and working abroad who will present their life journeys, career paths and options for doctoral students and post-doctoral researchers in various disciplines and professions, both in and outside academia.

The year 2021 marks the Foundation's 20th anniversary. To mark this occasion, the Foundation plans to organise a series of activities at which it will present its work in the past 20 years. The central event will be the official ceremony, to be held around November. Since one of the most creative ways for presenting someone's work is through photographs, in 2021 the Foundation will also launch a Photo Competition, which will enable scientists to submit impressive photographs taken during their research. Selected authors will be rewarded during the ceremony.

The Foundation will continue publishing all information related to new programmes, as well as the results of ongoing calls, on its website and social media.