ANNUAL REPORT

2022

HrZZ
Croatian Science Foundation

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Opening address by **Director**

The year 2022 - year of changes and reforms

We are looking back on an extremely dynamic year in which the Foundation underwent substantial changes to its legal and financial framework and stopped operating as a non-profit organization.

The first day of 2022 signified an important milestone in the Foundation's financial status as it became a State Budget user under the heading of the Ministry of Science and Education. The Foundation is now obliged to follow budgetary book-keeping principles and is subject to the State Budget Act and the Act on State Budget Execution for 2022, which entails that it can only launch calls in line with available funds allocated to it in the State Budget and the Financial Plan for the current year and projections for upcoming years, which should be fully aligned with the State Budget for the current year and projections for upcoming years. In 2022, the Foundation was also actively preparing for Croatia's entry into the Eurozone and adapted to the mandatory dual display of financial amounts, which entailed amendments to all grant agreements and their addenda for all ongoing projects.

Mid-2022 saw the adoption of the Action Plan for Ensuring Administrative Capacities of the Croatian Science Foundation, which was a pre-requisite for the Foundation to take part in the implementation of the National Recovery and Resilience Plan (NPOO), where it will be involved in the pursuit of envisaged reforms of the academic system, development of research capacities and reforms of the system of funding research and innovation, all of which will enhance the Foundation's role in the national system of research and innovation. The Action Plan introduces numerous activities aimed at changing the Foundation's legal and normative framework, project monitoring procedures and enhancing the Foundation's operational capacities.

On 28 May 2022, the new Act on the Croatian Science Foundation (Official Gazette 57/22) was adopted, which defined the roles and responsibilities of the Foundation's existing bodies (Board, Director) and a new body (Complaints Committee). The new Statute of the Croatian Science Foundation entered into force on 3 November 2022, defining the organizational structure of the Foundation's office for performing professional and administrative affairs and roles and responsibilities of the Foundation's bodies. Shortly after, on 15 November 2022, the Regulation on Internal Order of the Croatian Science Foundation entered into force, regulating internal structure and management of organizational units, systematization of staff positions and other affairs relevant for the Foundation's operations. Pursuant to the legislative provisions, on 25 November 2022 a public call was launched for the position of the Director of the Croatian Science Foundation, with 25 December as the application deadline.

During 2022, we completed a lion's share of work preparing the documents for the new programme framework provided for within the investment priorities C3.2. R2-I1 and C3.2. R3-I1 (Young Researchers' Career Development Programme, Development Research Grants Programme, Mobility Programme and Targeted Scientific Research). The Foundation's employees also took part in the first round of workshops and trainings in order to acquire new knowledges and skills required for implementing the new NPOO programmes. The topics of these workshops included project selection and contracting, NPOO grant implementation, public procurement, verifying and sending reimbursement requests, etc. HRZZ employees and Board President put in substantial amounts of effort into the Horizon Europe's Policy Support Facility (PSF) in order to receive assistance for developing new programmes for stimulating applied research and technology transfer from public to private sector as well as developing and enhancing the Foundation's administrative and operational capacities.

The Foundation also continued supporting national activities related to promoting open science in Croatia. In order to raise researchers' awareness on the importance of responsible research data management, in accordance with openness and FAIR principle defining data collection, processing and storage principles as well as sustainable data access, re-use and sharing, the Foundation made it obligatory for all projects contracted from 2019 onward to draft a Data Management Plan (DMP), while from 2022 DMPs are a mandatory document in all calls to be submitted together with the project proposal. As one of the signatories of the Agreement on the Croatian Open Science Cloud (HR-OOZ) Initiative and member of the HR-OOZ Initiative Council, the Foundation also joined the activities of the Working Group for Drafting the National Open Science Plan and Policies and the Working Group for defining HR-OOZ structures and policies.

In 2022, the Foundation disbursed almost **HRK 246 million** for financing scientific research projects and young researchers' salaries. The majority of funds disbursed

in 2022 originated from the State Budget of the Republic of Croatia (90.87%), while other sources include ESI Funds and international collaboration (Swiss-Croatian Cooperation Programme). A total of 696 projects and 1,026 young researchers (research assistants and senior research assistants) were funded through various HRZZ programmes.

National funding of scientific research projects continued through programmes "Research Projects" and "Installation Research Projects". In 2022, the Foundation monitored 447 research and 173 installation projects as well as 15 projects implemented through the Call IP-CORONA. The new Call for Research Projects (IP-2022-10) was launched on 24 May 2022 with the total budget of HRK 120,000,000, or HRK 30,000,000 for the first year of implementation. By the submission deadline (05 October 2022), a total of 424 project proposals were submitted.

The Young Researchers' Career Development Project – Training New Doctoral Students saw 637 doctoral students funded in 2022 – of which 575 were funded from the State Budget and 62 from the European Social Fund. In addition, 318 young researchers (doctoral students and postdoctoral researchers) have been funded through research and installation projects, 38 are employed to work on projects of scientific collaboration with scientists in diaspora, 28 are involved with projects funded through the Swiss-Croatian Cooperation Programme, while 5 young researchers have been working on projects within the "Partnership in Research" programme.

The Foundation also continued with the implementation of two programmes under the auspices of the Swiss-Croatian Cooperation Programme: the Croatian-Swiss Research Programme 2017-2023 and Promoting Excellence in Higher Education – Tenure Track Pilot Programme. CSRP programme provides funding for 11 joint research projects jointly implemented by Croatian and Swiss scientists. The Tenure Track Pilot Programme provides funding for three projects led by excellent young scientists in the area of Natural Sciences. 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 2022.

In 2022, the Foundation took part in various other activities aimed at increasing the inclusion of Croatian scientists and institutions into the European Research Area through the Weave instrument and ERA-NET Cofund projects. A total of 18 collaborative projects funded through the Weave initiative were implemented in 2022. In addition, three new calls were launched – two with the Swiss National Science Foundation (SNSF) as the Lead Agency and one with the Slovenian Research Agency (ARRS) as the Lead Agency. The Foundation also funded projects in three ERA-NET consortia: two projects within BlueBio (ERA-NET Cofund on Blue Bioeconomy – Unlocking the potential of aquatic bioresources), one QuantERA project (ERA-NET Cofund in Quantum Technologies) and two Chanse projects (Collaboration of Humanities and Social Sciences in Europe). In addition, the Foundation also funded one project awarded funding through the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP).

The reforms planned for next and future years, which include the enhancement of the existing and introduction of a new programme framework, securing a stable and predictable multi-annual cycle of calls for basic, applied, development and targeted research, researchers' career development, mobility and networking, cannot be successfully implemented without increasing the amount of budgetary funds made available to the Foundation and enhancing the Foundation's administrative capacities for implementing national programmes as well as programmes funded from European and other international sources.

Prof. **Ozren Polašek**, PhD, MD

Director of the Foundation

Interview with Dr Lidia Borrell-Damián, Secretary-General of Science Europe

The human aspect in science must be preserved

HRZZ: What really made 2022 stand out for Science Europe?

LBD: Science Europe reached several important milestones in 2022. We published a Values Framework for the Organisation of Research, a Direction Paper on Open Science, and we held our first Conference on Open Science online, with more than 600 participants from across the world. Together with the Swiss National Science Foundation, we organised the High-Level Workshop to discuss ethics and integrity in the context of public engagement, and we organised a conference on brain circulation and reducing R&I discrepancies in Europe, under the auspices of the Czech Presidency of the Council of the EU. Last, but certainly not least, in partnership with the European Commission and the European University Association, we created the Coalition on Reforming Research Assessment (CoARA).

Secretary-General of Science Europe,
Lidia Borrell-Damián

Less visible, but equally important, was our membership in the European Research Area (ERA) Forum. It took years of advocacy to the European Commission to allow research stakeholders to be part of the ERA Governance. Our initial petition was in 2012 when Commissioner Máire Geoghegan-Quinn created the ERA stakeholders' platform. But it took until the end of 2021 for the ERA Forum to be established, which comprises representatives from research stakeholder organisations and of EU Member States.

HRZZ: There are six working groups in Science Europe. What were the most significant working groups activities and milestones in 2022? Can you single out a working group which had outstanding results in 2022?

LBD: All Working Groups were very active throughout the year, and our members nominated excellent representatives to each of them. Some groups are more of a continuation, such as Horizon Europe and the High-level Policy Network, while the Working Groups on Research Culture, Open Science, the Green and Digital Transition, and Communication are new. They represent a major breakthrough for us, as it is the first time Working Groups on these topics have been implemented. Since all of these groups were formed during the COVID-19 pandemic, they were also only able to meet in person for the first time in 2023.

The Working Group on Communication is very special to us, as it is a unique structure of national organisations who address science communication. They discuss, among others, how to fight fake news, how to improve trust in science, and how to better connect with citizens. Together with our Belgian colleagues at the National Research Fund (FNRS) and Research Foundation Flanders (FWO), we are preparing a high-level conference on Science Communication in 2024, under the auspices of the Belgian presidency of the Council of the EU. Our objective for this conference is to raise awareness at political level that science communication issues are an integral part of the scientific process and that research funding and performing organisations should embed these issues in their programmes and projects.

> **My dream is that, in ten years, Europe will have made substantial progress towards the European Research Area. Excellent researchers would be moving seamlessly across the continent with full economic and social rights.**

HRZZ: What is the main value of Science Europe for its members who come from widening countries?

LBD: Science Europe helps to identify issues that cut across all the so-called widening countries. We issued a position statement on that last November, during the conference in the Czech Republic previously mentioned. Our 'Recommendations to Reduce Research and Innovation Disparities and Foster Brain Circulation' present six key messages to move towards more integration of R&I efforts in Europe. We strive for these to be taken into account for the next Framework Programme.

We made it clear at the conference that funding instruments put all the widening countries in the same basket when, in reality, there are differences in every country. Our plan for 2023–24 is to set up a platform within Science Europe where we can study the specific needs of each of our members from widening countries, based on the cross-cutting issues identified.

HRZZ: Having done all this work at Science Europe, what is your dream

for Europe and especially for European research in ten years?
LBD: My dream is that, in ten years, Europe will have made substantial progress towards the European Research Area. Excellent researchers would be moving seamlessly across the continent with full economic and social rights. I also hope that a more coherent system for research careers is in place and, of course, a very good, flexible research assessment system as well.

HRZZ: Since you mentioned research assessment, how standardised is it across Europe?
LBD: Research assessment is quite standardised in general terms. Ethics and integrity, as well as research excellence, are a must in research assessment processes. After that, one can set up other criteria for assessment as appropriate for specific values in different research fields. There is a trend to rely on figures such as the journal impact factor and similar quantitative indicators, which is difficult to change. A lot of thought is being put into new metrics in many places; even in CoARA, although it does not have the objective to define the next set of indicators. We first need to better define what is good for science and what improves its quality.

In dialogue on research between government and society, freedom of research enquiry must be preserved for researchers to explore the frontiers of knowledge without constraints determined by economic or political interests. This is not only very important for the social sciences and humanities, but for many other fields as well. Science has a human aspect that must be preserved.

HRZZ: What are the biggest threats to this dream?
LBD: The biggest threats to this dream are the forces that want to instrumentalise research, putting it purely at the service of economic profit, or those who want to restrict freedom of scientific inquiry. Of course, I am not against commercial use of research output, but the generation of new knowledge should be the main driving force. In dialogue on research between government and society, freedom of research enquiry must be preserved for researchers to explore the frontiers of knowledge without constraints determined by economic or political interests. This is not only very important for the social sciences and humanities, but for many other fields as well. Science has a human aspect that must be preserved.

National Recovery and Resilience Plan 2021-2026

The Recovery and Resilience Mechanism was introduced to alleviate the economic and social consequences of the pandemic and ensure quick economic recovery, digital and green transformation and greater resilience of the society and economy to future crises at the EU level. The pre-requisite for utilizing funds from the Mechanism is the adoption of the National Recovery and Resilience Plan (hereinafter: NPOO), which lists key reforms and investments crucial for Croatia's faster recovery and enhancing its capability to face momentary crises with lower economic and social costs. NPOO envisions the transformation of Croatia's economy by means of innovative policies to be achieved through modernization and digital and green transition. One of the components pertains to the enhancement of the science and education system as the basis for Croatia's competitiveness in the future. Research and innovation capacities are to be enhanced through strengthening scientific excellence, encouraging open science and collaboration with the business sector. NPOO also highlights the need to enhance human, institutional and infrastructural capacities of research institutes and universities, which, together with the entrepreneurial infrastructure, build the framework for innovation and materialization of entrepreneurial ideas. However, several conditions need to be met before research excellence and innovation capacities can be enhanced, such as creating adequate work conditions for talented young researchers, greater integration into the European Research Area (ERA), investing in basic research without which there can be no applied research and innovation as well as investment in new research infrastructures.

NPOO measures to be implemented by HRZZ are part of two major investment priorities. Within investment C3.2 R2-I1 "Developing a stimulating career advancement model and conducting leading scientific research in STEM and ICT", HRZZ will be implementing three programmes: Young Researchers' Career Development – Training New Doctoral Students, Development Research Grants Programme and Mobility Programme. As part of investment C3.2 R3-I1 "Introducing a more functional programme framework for programme financing of research, development and innovation", HRZZ will be implementing the programme Targeted Scientific Research.

NPOO reform measures

For the purpose of implementing reform measures within NPOO pertaining to more efficient financing of research, development and innovation and strengthening HRZZ's role in the national research and innovation system, May 2022 saw the adoption of the Action Plan for Ensuring Administrative Capacities of the Croatian Science Foundation (hereinafter: Action Plan). The Action Plan provides a detailed overview of activities necessary for completing the restructuring process between the period 1 May 2022 and 31 December 2023. The main activities include adoption of new basic acts, normative framework and manuals, introduction of new programme framework and project monitoring framework and strengthening HRZZ's operational capacities.

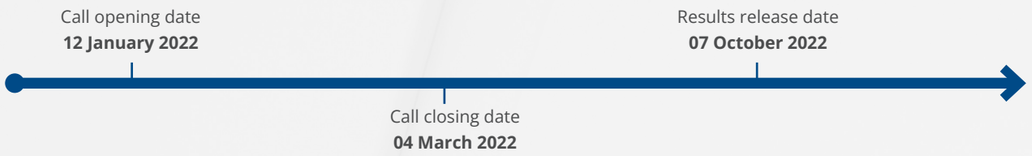
The implementation of Action Plan activities has been supported through technical assistance provided within the Consultancy Agreement "Strategic Partnership for Research, Innovation and Growth" (SPRING Project) signed between the Ministry of Science and Education and the World Bank and through the European Commission's Horizon Policy Support Facility (PSF) for supporting policies in the EU's Horizon Europe Framework Programme. Independent experts from the PSF team held numerous meetings and interviews with various stakeholders in the national research and innovation system. The first round of interviews, held in late June/early July 2022, included representatives of faculties, institutes, thematic innovation councils, ministries, agencies, World Bank, Croatian Agency for SMEs, Innovation and Investments (HAMAG-BICRO) and HRZZ, while in October 2022 in-depth interviews were held with representatives of HRZZ, HAMAG-BICRO and the Ministry of Science and Education. Topics discussed with HRZZ representatives included roles and modus operandi, human resources, available funds, programmes and activities and perception of external beneficiaries regarding the Foundation's activities. The final draft of the report „PSF to support early stages of innovation and science-business linkages in Croatia" was made public in late 2022, presenting the analysis of the national science and research system and specific recommendations to both the Ministry of Science and Education and HRZZ.

The report highlights that the Croatian academic community recognises and appreciates the role of the Croatian Science Foundation as the central national organization for financing scientific research projects but that the annual budget of EUR 12 million available for project financing is extremely low and insufficient. It has also been emphasised that HRZZ is a vital source of financing for young researchers who are included to work on competitive projects and directed toward internationally recognised research topics and objectives. A large part of HRZZ's previous accomplishment are the result of personal engagement of employees and external associates and their vision to transform the Croatian academic community into a competitive community. As highlighted in the report, the current programme framework has been designed primarily with scientific excellence in mind, which should not be abandoned in the future as the primary objective. PSF experts recognise HRZZ's potential to transform into a strong science foundation that would have strong human, material and financial capacities on a par with other science foundations across Europe and that would be recognised in the European Research Area as an organization that funds scientific excellence for the well-being of society and economic progress.

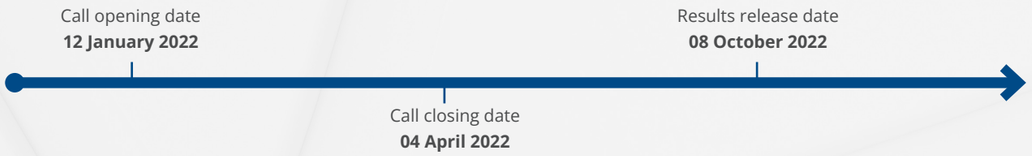
Specific recommendations from PSF's report pertain to strengthening HRZZ's position, further alignment of national programmes with EU's research funding programmes, greater importance and impact of basic research, bringing research and innovation sectors closer together and creating more inspiring working environments in research organizations. However, none of these recommendations can be achieved without increasing HRZZ's budget, not only for ongoing and new programmes but also for enhancing human and material capacities. An additional recommendation pertains to implementing a new programme framework aimed at collaboration with the economic sector, which requires employees to acquire new skills, which can be achieved through further education and getting the employees involved in the evaluation processes of Horizon Europe and other EU programmes. The new programmes should reflect the distinctive features of the Croatian legislative and research context and be aligned with EU guidelines and best practices in EU's research and innovation programmes (e.g. proof of concept principle in Horizon Europe). Equal attention should be paid to new funding programmes aimed at applied research, as well as ensuring excellence and greater impact of basic curiosity-driven research or basic challenge-based research, in accordance with S3 objectives. HRZZ's portfolio expansion from basic toward applied research should include new schemes that would bridge the gap between the research and business sectors and enable researchers additional funding for applying their research results and further commercialization. The report also recommends that the administrative burden in the application, evaluation and implementation stages should be reduced.

Calls in 2022

Call “Research Projects – Slovenian-Croatian Bilateral Projects” (IPS-2022-02)

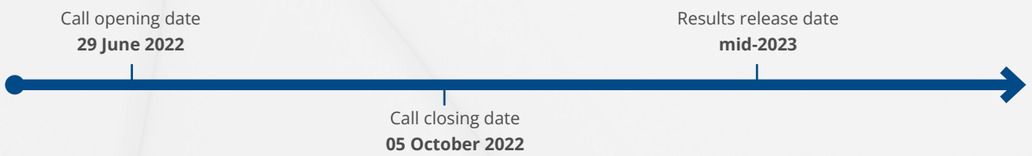


Call “Research Projects – Swiss-Croatian Bilateral Projects” (IPCH-2022-04)



Call “Research Projects” (IP-2022-10)

Call “Research Projects – Swiss-Croatian Bilateral Projects” (IPCH-2022-10)



HRZZ **Organisational structure**

The new Act on the Croatian Science Foundation entered into force on 28 May 2022 (OG 57/2022). Pursuant to this Act, HRZZ’s bodies are the Board, Director and Complaints Committee.

With the new Act entering into force, the mandate of the previous Executive Director Assoc. Prof. Irena Martinović Klarić, PhD was terminated, but, as per Board decision, she remained in office as Acting Director until the appointment of the new director. The public tender for the position of the Director of the Croatian Science Foundation was published in the Official Gazette on 25 November 2022 with 25 December as the application deadline. The new Director will be appointed in early 2023.

Members of the fifth assembly of HRZZ’s Board

Professor **Nikola Ružinski**, PhD, Board President

Professor **Željko Kaštelan**, PhD, MD, FCA, Deputy President

Professor **Anna-Maria Getoš Kalac**, PhD, Deputy President

Professor **Srećko Kovač**, PhD

Professor **Milan Mesić**, PhD

Dr **Slavko Perica**, PhD

Professor **Dražen Vikić-Topić**, PhD

In November 2022, the Ministry of Science and Education also launched a public call for nominating candidates to the Complaints Committee, with 10 January 2023 as the application deadline. Members of the Complaints Committee are appointed from the pool of senior scientists with a scientific rank of scientific advisor or higher and university professors with a rank of full professor or higher with previous experience of managing research projects and evaluating project proposals. The Complaints Committee consists of five members, which are appointed by the Croatian Parliament upon proposal by the Croatian Government following a public call published by the ministry competent for science. They are appointed to a four-year term.

The Regulation on Internal Order of the Croatian Science Foundation entered into force on 15 November 2022, whereby HRZZ was restructured into 6 new offices, further divided into 11 departments and Internal Control and Audit Unit. As on 31 December 2022, the Foundation had 36 employees (including 3 employees on various types of parental leave and 4 employees hired for implementing activities funded from the European Social Fund). All HRZZ’s employees have full-time contracts.

Activities of the Foundation's Board in 2022

The Board held 30 sessions in 2022, of which 17 were held in electronic form. Below we provide an overview of the most relevant decisions and conclusions of the Board adopted in 2022.

Overview of decisions and conclusions

HRZZ ACTIVITIES

➞ Following the official notice by the Ministry of Finance of the Republic of Croatia sent on 21 September 2021, on 28 September 2021 HRZZ submitted the request to be entered in the Registry of Budgetary and Extra-budgetary Users, starting from 1 January 2022, whereby HRZZ became subject to budgetary book-keeping principles under the heading of the Ministry of Science and Education. In addition, pursuant to the Budget Act, HRZZ became subject to the Act on State Budget Execution for 2022. In line with the above, the Board adopted numerous documents and interpretations in 2022 that pertain to HRZZ's new status as a budget user. These include: Decision on employees' material rights, Work Plan for upcoming year, Financial Plan in line with the new guidelines, Financial Plan Revision in line with State Budget limits, public procurement rules, etc.

➞ Pursuant to the Act on the Croatian Science Foundation, the new Statute of the Croatian Science Foundation was adopted, entering into force on 3 November 2022

➞ Pursuant to the Act on the Croatian Science Foundation, the new Regulation on Internal Order was adopted, entering into force on 15 November 2022

➞ Guidelines on introducing the Euro in HRZZ's operations entered into force on 5 September 2022. They pertain to the project implementation, application and monitoring stages.

➞ At its 41st session held on 21 November 2022, the Board launched a public tender for the position of the Director of the Croatian Science Foundation and nominated a Selection Committee among its members.

➞ On 24 January 2022, HRZZ's delegation, headed by the Board President, Professor Nikola Ružinski, PhD, presented HRZZ's work to the President of the Republic of Croatia, Mr. Zoran Milanović.

➞ Prof. Nikola Ružinski, Board President, represented HRZZ at the Science Europe General Assemblies, held in Brussels in May 2022 and Zurich in November 2022.

CALLS LAUNCHED IN 2022

➞ **Research projects (IP-2022-10)**

At its 24th session held on 19 May 2022, the Board adopted the decision on launching the Call IP-2022-10 with the total budget of HRK 120 million. This marks the first Research Projects call that was also open to bilateral and trilateral project proposals including researchers from Switzerland and Slovenia within the Weave initiative. HRZZ was the Lead Agency for this call, which means that the evaluation procedure was to be implemented according to its internal procedures, while partner organizations acknowledge such an evaluation procedure pursuant to the Agreement on Mutual Recognition of Evaluation Results. The submission deadline expired on 5 October 2022, in which time 424 proposals were submitted, of which 53 within the Weave initiative. By the end of 2022, the administrative check of the submitted proposals was completed.

➞ **Public call for nominating Evaluation Panel members for Call IP-2022-10**

The Board launched a public call for nominating Evaluation Panel members for Call IP-2022-10. Due to a large number of submissions to the Call IP-2022-10, some current panel members were unable to participate in the panels' work and had to be replaced by new members. Evaluation panel members are appointed following a public call or, in case an insufficient number of nominations has been received, upon nomination by the Board.

➞ **Bilateral research projects IPCH-2022 and IPS-2022**

Two new calls for bilateral collaboration with researchers from Switzerland and Slovenia were launched within the Weave initiative. HRZZ acted as the Partner Organization in both calls. At its 44th session held on 20 December 2022, the Board adopted the plan of bilateral calls for 2023, together with the call documents:

– "Research Projects – Swiss-Croatian Bilateral Projects" (IPCH-2023-04) to be launched on 02 January 2023, with 1 April 2023 as the submission deadline (5 April for proposals submitted to HRZZ)

– "Research Projects – Slovenian-Croatian Bilateral Projects" (IPS-2023-02) to be launched on 06 January 2023, with 17 February 2023 as the submission deadline.

➞ **Joining CHIST-ERA consortium**

At its 44th session held on 20 December 2022, the Board adopted a decision approving HRZZ joining the CHIST-ERA consortium. CHIST-ERA is a consortium of research funding organizations in Europe and beyond supporting basic research in the area of information and communication technologies (ICT). The CHIST-ERA consortium itself is supported through Horizon Europe's Pathfinder programme run by the European Innovation Council. CHIST-ERA supports new and multidisciplinary research showing potential to lead to significant technological discoveries in the long term.

➞ **Cooperation with other European RFOs**

At its 44th session held on 20 December 2022, the Board, in line with provisions of the Multilateral Lead Agency Agreement (MLA), adopted the decision on initiating collaboration with the Czech Grant Agency (GAČR). Pursuant to the said Agreement, as of 2023 calls of both agencies will be open for joint proposals of Croatian and Czech researchers. The same session also saw the adoption of the Agreement for the implementation of bilateral cooperation with GAČR.

IMPLEMENTATION OF THE NATIONAL RECOVERY AND RESILIENCE PLAN 2021-2026

At its 27th (electronic) session held on 17 June 2022, the Board adopted the text of the Agreement on Delegated Tasks within Component C3. Education, science and research, Sub-component C3.2 Raising research and innovation capacities of the National Recovery and Resilience Plan 2021-2026 (hereinafter: Agreement). The Agreement was signed between the Ministry of Science and Education and HRZZ. The Agreement defines the aspects of collaboration between the Ministry as the Competent Body (NT) and HRZZ as the Implementing Body (PT) to which the Ministry may delegate a part of NT functions under its jurisdictions. First Calls are expected to be launched in early 2023.

HRZZ PROJECT MONITORING PROCEDURES

➞ **Nomination of independent experts for monitoring projects financed by the Croatian Science Foundation**

Public call for the nomination of independent monitoring experts was launched in September 2021. A total of 238 scientists sent in their applications. At its 17th (27 January 2022) and 20th session (25 March 2022), the Board appointed 39 experts, scientists with nationally relevant and internationally acknowledged achievements, from all scientific disciplines to monitor projects funded by HRZZ. In April 2022, HRZZ staff held introductory workshops with the appointed experts to introduce them to the project monitoring procedures and rules. The newly appointed experts were assigned their first tasks in April 2022.

➞ **Changes to the disbursement schedule for HRZZ projects due to alignment with HRZZ's new status as Budget user as of 01 January 2022.**

In line with HRZZ's new status as a State Budget user, it was necessary to adapt the mode and dynamics of monitoring funded projects. In order to secure continuous implementation and support to projects, the Board adopted the decision that project funds would be disbursed in two instalments per reporting period. The first instalment will be disbursed upon receiving the periodic report, while the second instalment will be disbursed halfway through the reporting period. Unused and inappropriately used funds are added up throughout the project and recorded in each periodic report and reduced from the amount of the final instalment. HRZZ staff continuously monitor expenditures of each project and may adjust the

disbursements even before the final period, if necessary. This new arrangement enables greater degree of fiscal responsibility and fewer refunds of unused funds.

➞ Decision on reporting "internal" receipts in financial reports

Upon close analysis, the Board regulated the status of internal receipts which are, as of June 2022, no longer acceptable costs for services provided within the Organization pertaining to equipment listed in the Organizational Support Letter, for which consumables, repair and upgrade costs have been provided through the Project.

➞ Changes to financial reporting procedures

At its 17th session held on 27 January 2022, the Board adopted the changes to the Project Monitoring Manual, Guidelines for Completing Reporting Forms, Guidelines for Recruiting Young Researchers to HRZZ projects and new draft of the Addendum to the Grant Agreement, all intended to simplify the procedure of financial monitoring of HRZZ projects. The new and simplified procedure has been in force since 01 February 2022. Research organizations hosting the scientific research projects are still obliged to deliver reports on appropriate use of funds but are no longer required to deliver copies of all realised costs (receipts, salary slips, travel orders and other documents).

➞ New procedure for on-the-spot checks

As of 01 January 2022, HRZZ has been entered into the Registry of Budgetary and Extra-budgetary Users and became subject to the Budget Act, Fiscal Responsibility Act and the Internal Control System Act. At its 36th session held on 07 October 2022, the Board defined the Instructions for conducting on-the-spot checks pursuant to the Guidelines for Conducting On-the-spot Checks at Recipients of State Budget Transfers issued by the Ministry of Finance (Internal Revision and Control Unit), which includes the procedure of appointing a controller and control plan. The first cycle of on-the-spot checks has been implemented in the second half of 2022.

➞ Extension of funding of doctoral students' salaries

At its 36th session held on 07 October 2022, the Board decided that Contracts on Mutual Rights and Obligations for Implementation of Doctoral Student's Career Development Plans may be extended for all doctoral students funded through the Young Researchers' Career Development Project - Training New Doctoral Students if the mentor's requests are justified and positively evaluated, with no additional administrative procedures and Board decisions. The decision above also pertains to all other programmes which provide funding for doctoral students (ESF-DOK-2018-01, Research Cooperability (PZS-2019-02) and Croatian-Swiss Research Programme (CSRP-2018-01)).

➞ Amendments to the Guidelines for Recruiting Young Researchers to HRZZ's projects

At its 45th session held on 28 December 2022, the Board adopted the amended version of the Guidelines for Recruiting Young Researchers to HRZZ-funded projects. The previous text of the Guidelines has been updated in order to align it with the Act on Higher Education and Scientific Activity (OG 119/2022). The document provides the most relevant guidelines for employing research assistants and senior research assistants to work on HRZZ-funded projects. The salary of a research assistant may be financed through HRZZ throughout the project implementation period. Since the new Act defines that employment contracts with research assistants may not be concluded for a period shorter than five or six years (depending on type of institution), in case that the project or the Organization itself is unable to provide funding for the entire period as defined in the Act, before concluding an employment contract with the research assistant, the Organization needs to obtain consent of the Ministry of Science and Education or other competent body to cover the salaries for the remaining period from the State Budget.

➞ Introducing the Data Management Plan (DMP)

At its 14th session held on 21 December 2021, the Board defined the format and the procedure for introducing Data Management Plans into the project monitoring procedure. Data Management Plan (DMP) is the first step toward more open science, encouraging dissemination and enabling re-use of research data and results. Sharing research data increases visibility, citation numbers and collaboration between scientists. DMP is a document that contains a list activities and datasets that are planned to be produced within the research, describing how the data will be stored and what will become of it after the project has finished. As of 15 March 2022, all project reports for projects funded through calls launched in 2019 and later must include DMPs. DMPs were not subject to evaluation in 2022; rather, HRZZ used them to receive feedback on how data resulting from HRZZ-funded projects is managed.

HRZZ programme funding in 2022

In 2022, HRZZ disbursed a total of **HRK 245.71 million** for financing scientific research projects and young researchers' salaries.

In sum, from its establishment in 2001 until the end of 2022, HRZZ disbursed **HRK 1,444,884,939 million** in total for projects and young researchers.

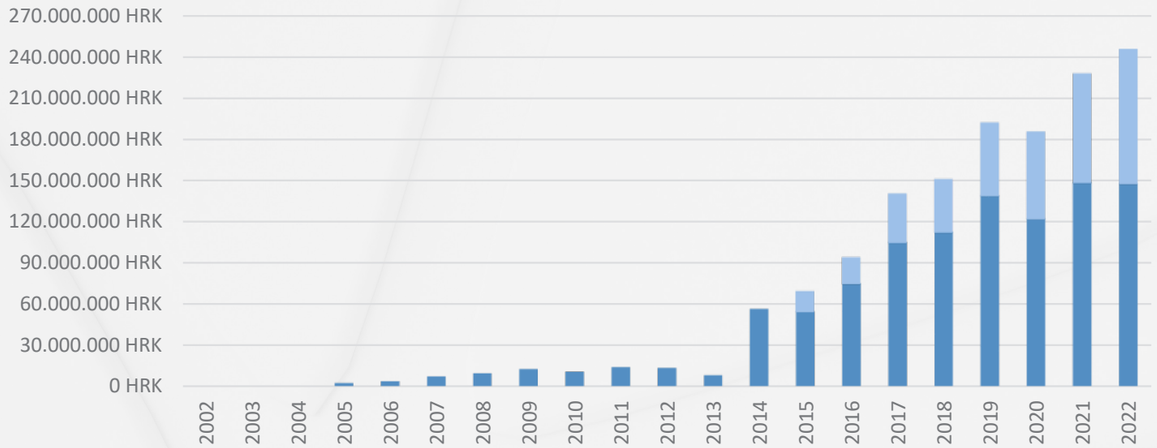


Figure 2. Annual amounts of funding for scientific research projects and young researchers in the period 2002-2022

As in previous years, the majority of funds disbursed in 2022 originated from the State Budget of the Republic of Croatia (90.87%), while other sources include ESI Funds and international collaboration (Swiss-Croatian Cooperation Programme).

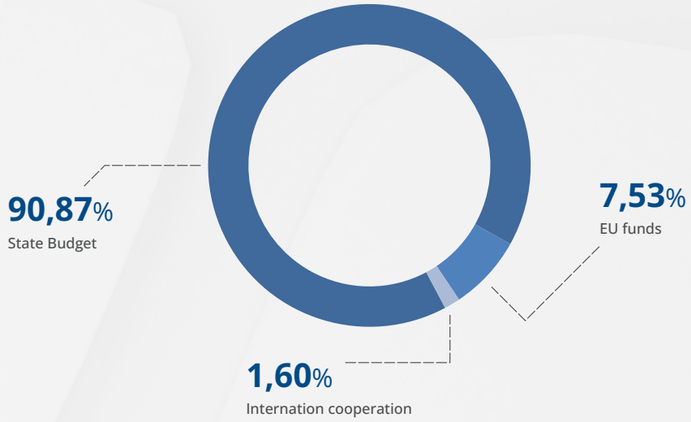


Figure 3. Funding sources for scientific research projects and young researchers in 2022

A total of 696 projects and 1,026 young researchers (research assistants and senior research assistants) were funded in 2022 through various HRZZ programmes. The largest part of funds was disbursed to young researchers (HRK 98.12 million, or 39.93% of HRZZ's budget), research projects (HRK 84.56 million, or 34.42% of the budget) and installation research projects (HRK 44.55 million or 18.13% of the budget).

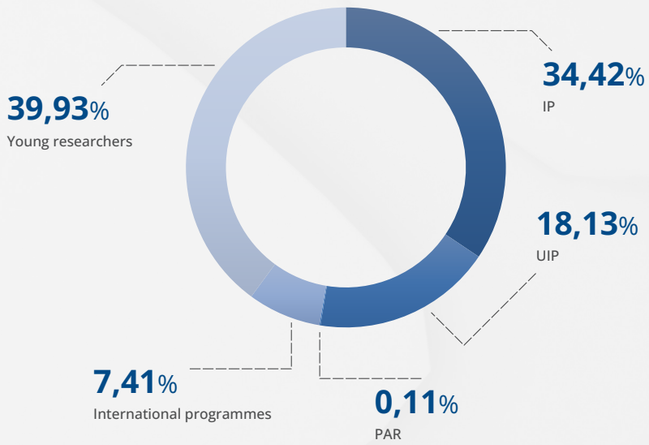


Figure 4. Funds disbursed in 2022 per Programme

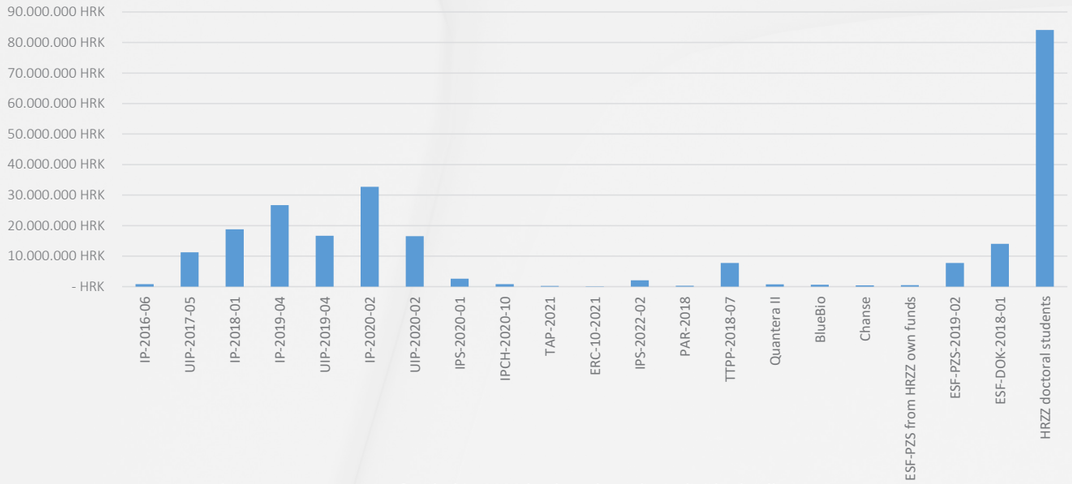


Figure 5. Programmes funded in 2022 broken down by individual calls

Young researchers are supported through the following programmes: "Young Researchers' Career Development Project – Training New Doctoral Students" (research assistants), "Installation Research Projects" (research assistants and senior research assistants) and "Research Projects" (senior research assistants). The Young Researchers' Career Development Project is financed from budget source 11 - General revenues and receipts (activity "HRZZ Doctoral and post-doctoral-researchers programme") and from sources 561 - European Social Fund and 12 - Grant contributions (activities within Operational Programme Efficient Human Resources 2014-2020). The majority of funds spent on the young Researchers' Career Development Project in 2022 originated from the funds carried over from the previous year (85.73%), while the remainder (14.27%) was disbursed from ESF and national contribution.

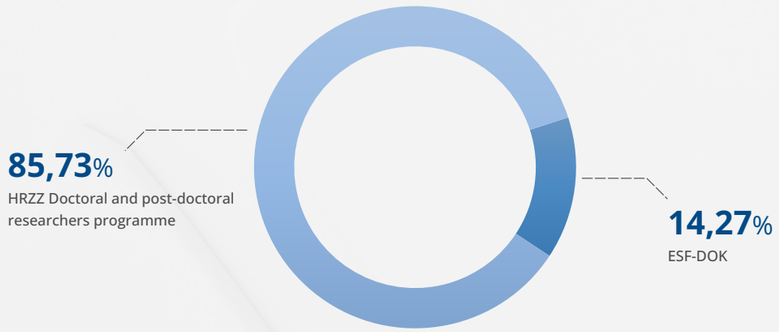


Figure 6. Young researchers funded in 2022 broken down by funding sources

NATIONAL FUNDING PROGRAMMES

Research Projects

The Programme "Research Projects" (IP) 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 objective of the Programme is to stimulate and support research teams that can compete at the international level and scientists that would be able to mentor a new generation of young researchers. Research projects are based on strong research teams formed at Croatian scientific institutions and include integration of scientific organisations, equipment and the development of young researchers. The maximum duration of research projects is 48 months, and the maximum amount of funding is between HRK 1,000,000 and 1,500,000 (HRK 600,000 and 900,000 for projects in the Social Sciences and Humanities).

Funds disbursed for Programme in 2022
HRK 79,05 million

Call IP-2022-10

The Call IP-2022-10 was launched in May 2022 with an overall budget of HRK 120,000,000, or HRK 30,000,000 for the first year of implementation. The submission deadline was 05 October 2022. 424 project proposals were submitted to the Call. The total budget requested by all submitted proposals is around HRK 510,000,000.

The distribution of proposals to this Call based on the scientific areas declared by the Principal Investigators is as follows: the largest number of proposals was submitted in Natural Sciences (33%), followed by Biomedicine and Health Sciences (18%), Technical Sciences (17%), Humanities (13%), Biotechnical Sciences (10%) and Social Sciences (8%). Two submitted proposals (0.5%) have been classified as interdisciplinary.

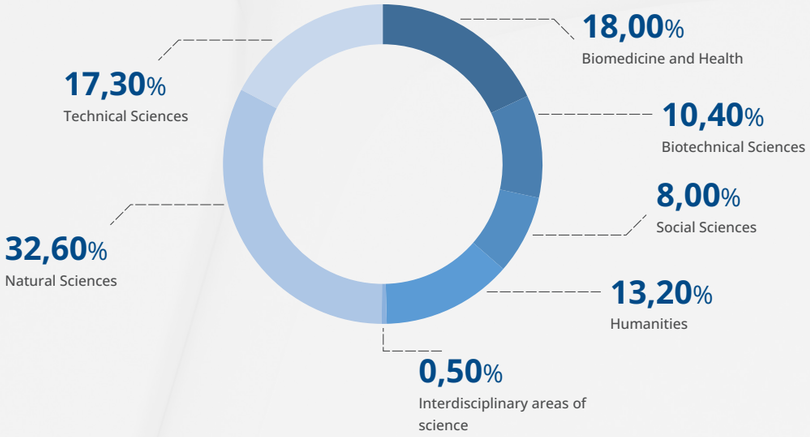


Figure 7. Percentage of project proposals submitted to Call IP-2022-10 per scientific area

The Call also enabled the submission of proposals within the Weave initiative, with HRZZ assuming the role of Lead Agency for the first time, meaning that the evaluation procedure will be conducted according to its internal procedures. A total of 53 project proposals (12.5% of all submissions) were submitted through the Weave initiative, of which 4 trilateral and 49 bilateral project proposals. Of the 49 bilateral proposals, one entails collaboration with a Swiss research team, while 48 are collaborations with Slovenian scientists.

By the end of 2022, the eligibility check of all proposals was completed, while the evaluation and final selection will be finalised in 2023.

Monitoring ongoing research projects

In 2022, we monitored the implementation of 447 research projects and disbursed HRK 79,053,107.73 to these projects on the basis of periodic projects reports, which were evaluated by 914 peer scientists. More than 9,870 scientists are engaged in activities of research projects, which includes Principal Investigators (PIs) and team members, of which 152 are post-doctoral researchers (senior research assistants). The largest number of projects are funded in the Natural Sciences (34.7%) and Biomedicine and Health Sciences (18.1%), while the institutions implementing the largest number of projects are Ruđer Bošković Institute (82 projects) and three faculties of the University of Zagreb – Faculty of Science (43 projects), Faculty of Electrical Engineering and Computing (26) and School of Medicine (20).

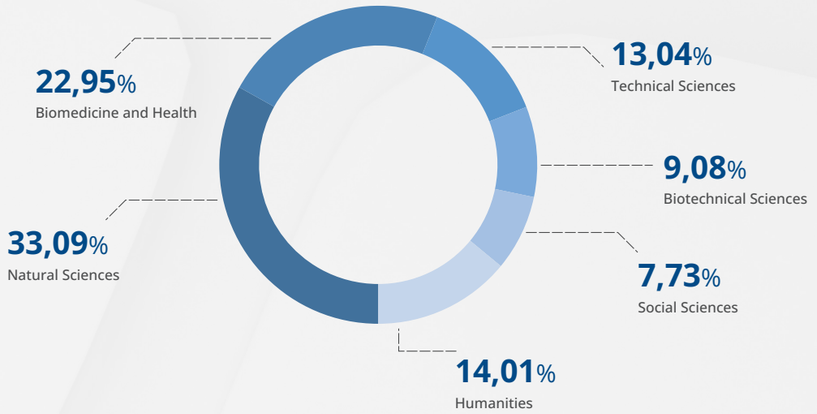


Figure 8. Percentage of Research Projects implemented throughout 2022 per scientific area

Based on the information retrieved from the Croatian Scientific Bibliography (CROSBI), the Research Projects achieved the following results in 2022: 15 books and 138 book chapters published, 1541 conference abstracts, 208 proceedings, 317 doctoral/master/graduation theses, 1289 papers in academic journals and 2 textbooks.

Research Projects – IP-CORONA thematic call

The thematic Call IP-CORONA is intended for financing basic and applied scientific research that creates new and improves existing knowledge on the COVID-19 pandemic and enhances the resilience of society against crisis situations, with an emphasis on health preservation, sustainable economic recovery and the development of high-quality and inclusive educational system in the Republic of Croatia. Fifteen projects financed through this Programme were in their implementation stage in 2022, but no funds were disbursed for their implementation.

Of the 15 funded projects, 11 finished their implementation by the end of 2022 (all projects funded through the Call IP-CORONA-2020-04), while the remaining four projects accepted for funding through the Call IP-CORONA-2020-12 will finish in early 2023.

Installation Research Projects

Funds disbursed for Programme in 2022

HRK 44,55 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 are 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 laboratories by recruiting research assistants and senior research assistants as well as 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 should 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 2022, HRZZ monitored the implementation of 173 research projects and disbursed **HRK 44,551,721.99** to these projects on the basis of periodic projects reports, which were evaluated by 245 fellow scientists. More than 1,100 scientists are engaged in activities of installation research projects (Principal Investigators and team members), including 137 doctoral students/research assistants and 29 post-doctoral researchers/senior research assistants employed. The largest number of projects are funded in the Natural (30.6%) and Technical Sciences (27.1%), while the institutions implementing the largest number of projects are the University of Zagreb Faculty of Science, Ruđer Bošković Institute and the Faculty of Electrical Engineering and Computing of the University of Zagreb.

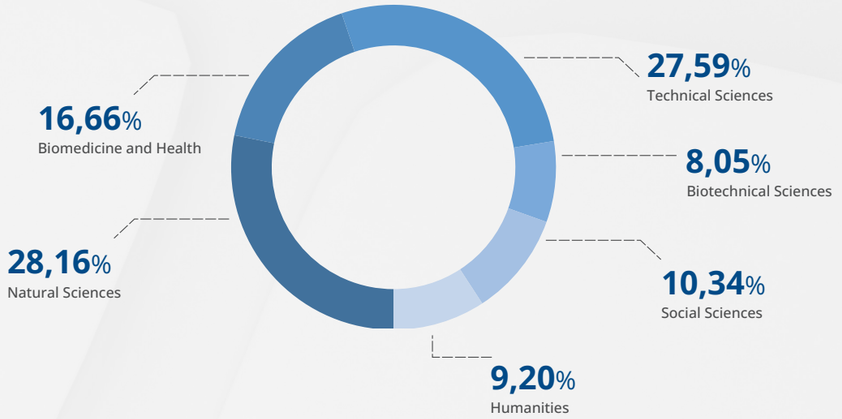


Figure 9. Percentage of Installation Research Projects implemented throughout 2022 per scientific area

Based on the information retrieved from the Croatian Scientific Bibliography (CROSBI), the Installation Research Projects achieved the following results in 2022: 8 books and 21 book chapters published, 661 conference abstracts, 137 proceedings, 410 papers in academic journals and 110 doctoral/master/graduation theses.

NATIONAL FUNDING PROGRAMMES

Partnership in Research

Funds disbursed for Programme in 2022

HRK 272,824
thousand

The Programme supports partnerships in research between public universities or public scientific institutes in Croatia and extra-budgetary organizations from Croatia or abroad (e.g. enterprises, 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 the economy or society. Research costs of the scientific institution are covered by HRZZ, 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.

There have not been any new calls launched in 2022 within this Programme. A total of HRK 272,824.55 was disbursed in 2022 to two projects still in implementation from previous calls. Four doctoral students and one post-doctoral researcher have been recruited to these projects so far.

INTERNATIONAL PROGRAMMES

HRZZ implemented three calls in 2022 through the WEAVE initiative in the capacity of Partner Agency – two with the Swiss National Science Foundation (SNSF) and one with the Slovenian Research Agency (ARRS).

WEAVE

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; rather, project proposals are submitted to existing national or regional funding programmes, while the evaluation is based on 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.

In 2022, HRZZ started negotiations with the Czech Grant Agency (GAČR) and the German Research Foundation (DFG). Collaboration with GAČR will start in early 2023 and the next available GAČR Call will also be open to Croatian researchers.

INTERNATIONAL PROGRAMMES

Research Projects – Slovenian-Croatian Bilateral Projects

Funds disbursed for Programme in 2022

HRK 4,66 million

Pursuant to the Bilateral Collaboration Agreement between the Slovenian Research Agency (ARRS) and the Croatian Science Foundation, in late 2021 the Foundation published the Call for co-financing the Croatian part of Slovenian-Croatian joint research projects (IPS-2022-02), with ARRS acting as the Lead Agency. By the submission deadline in February 2022, a total of 71 bilateral project proposals were submitted, with 68 being forwarded to the evaluation procedure following the eligibility check. The selection process was finished by late September with 8 projects accepted for funding and contracted. Their implementation started in late 2022. A total of HRK 2,082,836.50 was disbursed in 2022 for the first year of their implementation.

In addition, 8 projects funded through the Call IPS-2020-01 were also ongoing in 2022, with HRK 2,583,023.31 disbursed for their research activities.

INTERNATIONAL PROGRAMMES

Research Projects – Swiss-Croatian Bilateral Projects

Funds disbursed for Programme in 2022

HRK 838,318 thousand

Two calls for co-financing the Croatian part of Swiss-Croatian joint research projects were launched in 2022, with the submission deadlines on 1 April (IPCH-2022-04) and 1 October (IPCH-2022-10) respectively. SNSF served as the Lead Agency in both calls. Call IPCH-2022-04 saw 15 project proposal submitted, of which one was accepted for financing and will start its implementation in early 2023. Results of the Call IPCH-2022-10 will be published in the first half of 2023.

2 projects funded through the Call IPCH-2020-10 were also ongoing in 2022, with HRK 838,318.00 disbursed for their activities.

INTERNATIONAL PROGRAMMES

Swiss-Croatian Cooperation Programme

On 18 October 2022, the National and University Library in Zagreb was the venue for the signing ceremony of the Framework Agreement between the Government of the Republic of Croatia and the Swiss Federal Council on the Implementation of the Second Swiss contribution to selected EU Member States for reducing economic and social disparities within the European Union, which will see CHF 45.7 million allocated to Croatia.

HRZZ will be involved in the second Swiss grant, more specifically in programmes in the area of research and innovation. In order to respond to the need for better integration within the European Research Area, the Swiss National Science Foundation (SNSF) developed a new funding mechanism called Multilateral Calls for Joint Research Project (MCJRP), to be implemented within the second Swiss grant. This instrument provides for a multilateral call for proposals that would include several partner EU-13 countries.

INTERNATIONAL PROGRAMMES

Croatian-Swiss Research Programme (CSRP)

Funds disbursed for Programme in 2022

HRK 255,974 thousand

The Croatian-Swiss Research Programme is implemented by HRZZ in collaboration with the Swiss National Science Foundation (SNSF). The Programme funds 11 joint research projects implemented by Croatian and Swiss scientists in collaboration. By the end of 2022, one project finished its implementation, while the remaining ten projects were granted a cost-neutral extension, with HRZZ taking over the funding of salaries for employed doctoral students in their final (fourth) year of studies. A total of HRK 255,974.44 was disbursed for salaries in 2022 from HRZZ's activity "Doctoral and post-doctoral researchers programme".

17 young researchers and 4 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.

CSRP research teams published more than 20 research papers in 2002 and held over 40 conference presentations. One successfully defended doctoral dissertation should also be added to this list of outputs.

INTERNATIONAL PROGRAMMES

Promoting Excellence in Higher Education (TTP)

Funds disbursed for Programme in 2022

HRK 7,77 million

The Tenure Track Pilot Programme represents 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 support the establishment of the career of excellent young researchers in setting up an independent research group and acquiring conditions and skills for future employment. Such a Programme for excellent young scientists is a new model of career development based on clear and internationally competitive and comparable merit-based criteria. Three research groups are funded through this 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. Each project has a budget of around HRK 10 million. Apart from the three PIs, additional 11 young researchers are receiving their salaries from the Programme (five doctoral students and six post-doctoral researchers).

INTERNATIONAL PROGRAMMES

Cooperation Programme with Croatian Scientists in Diaspora "Research Cooperability"

Funds disbursed for Programme in 2022

HRK 8,26 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 early-career researchers. In addition, it is intended to develop and strengthen their capacities for participation in international calls.

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

The Research Cooperability Programme funds 23 projects which received a total of HRK 8,258,850.12 in funding in 2022. 31 doctoral students and 7 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 (17.39%), followed by Biotechnical Sciences and Social Sciences (8.69% each).

These projects produced the following outputs in 2022: more than 60 scientific papers, three book chapters and one book published, two doctoral dissertations defended, while project members presented their work at more than 120 national and international conferences.

INTERNATIONAL PROGRAMMES

ERA-NET programmes

Funds disbursed for Programme in 2022

HRK 1,83 million

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 co-funds these projects in the amount of up to 33% through the instrument recently renamed as 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. HRZZ finances two research teams within the BlueBio network, for which HRK 642,240 was disbursed in 2022.

The QuantERA network (ERA-NET Cofund in Quantum Technologies) 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. QuantERA II launched a transnational call in 2021, with 39 new projects selected for financing in the fields of quantum phenomena and resources and applied quantum science. This number includes one project with Croatian participation – *NImSoQ – New Imaging and control Solutions for Quantum processors and metrology*. The Croatian team is led by **Dr Neven Šantić** from the Institute of Physics. The project received HRK 767,773.80 of funds in 2022.

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. March 2021 saw the launch of the transnational Call ***Transformations: Social and Cultural Dynamics in the Digital Age***. The Call results were revealed in May 2022, and the list of contracted projects includes two projects with Croatian participation: R*esearching Europe, Digitalisation, and Conspiracy Theories* (Croatian team leader: **Prof. Dr. Nebojša Blanuša**, Faculty of Political Sciences, University of Zagreb) and *Digital Aestheticization of Fragile Environments* (Croatian team leader: **Dr Sanja Đurin, PhD**, Institute for Ethnology and Folklore Research). The two projects received HRK 417,900.00 of funds in 2022.

INTERNATIONAL PROGRAMMES

Trans-Atlantic Platform for Social Sciences and Humanities (T-AP)

Funds disbursed for Programme in 2022

HRK 241,500 thousand

The Trans-Atlantic Platform for Social Sciences and Humanities (T-AP) is a network of research funding organizations from Europe and the Americas. The aim of this platform is to raise public awareness on the relevance of social sciences and humanities in the 21st century. Within the thematic Call *"Recovery, Renewal and Resilience in a Post-Pandemic World"*, implemented in 2021, one project with Croatian participation was selected for funding . Implementation of the project started in June 2022 for a three-year period. The project *Inequalities, Community Resilience and New Governance Modalities in a Post-Pandemic World (ENDURE)* is coordinated by Dr. Mihai Varga from Freie Universität in Berlin, while the Croatian team is led by **Dr Senada Šelo Šabić, PhD** from the Institute for Development and International Relations.

INTERNATIONAL PROGRAMMES

Support to Researchers for Applying to European Research Council Programmes

Funds disbursed for Programme in 2022

HRK 110,873 thousand

This Programme supports mobility of Croatian researchers (Visiting Researcher), i.e. 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.

Call launched in October 2021 saw four proposals submitted, with two of them selected for financing. Both mobilities were realised in 2022 – **Dr Matija Čulo, PhD** from the Institute of Physics visited the University of Bristol (UK), while **Asst. Prof. Andrea Lučić** from the University of Zagreb Faculty of Economics and Business visited Utrecht University (Netherlands).

YOUNG RESEARCHERS' CAREER DEVELOPMENT PROJECT – TRAINING NEW DOCTORAL STUDENTS

Funds disbursed for Programme in 2022

HRK 98,12 million

One of the Foundation's strategic goals is funding career development of young researchers. The Programme 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 critical mass of 1,000 doctoral students constantly circulating through HRZZ's grant system.

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 top-notch 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 expenditures for employees. Calls within this programme are open for prospective mentors – 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.

On 31 December 2022, the Young Researchers' Career Development Project included 637 doctoral students, of which 575 were funded from the State Budget and 62 from the ESF (it should be noted that the funding of 26 ESF-funded doctoral students ceases on 31 December 2022). The total cost of doctoral students' salaries in 2022 amounted to HRK 98,122,152.68, of which HRK 84,115,560.30 was funded from the State Budget and HRK 14,006,592.38 from ESF. In addition, State Budget funds in 2022 were used to fund an additional 8 doctoral students in the CSRP programme and 3 in the PZS programme. HRZZ has taken over the funding of these doctoral students after the projects they were recruited to were completed, so that they could continue their doctoral research for the standard period of 48 months.

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 student's progress reports are an essential source of information to HRZZ regarding the doctoral student's progress, their achievements in both their doctoral studies and their research within the mentor's project. The monitoring procedure included 31 evaluators, who evaluated 329 reports in 2022.

In 2022, **93 doctoral students** obtained their doctoral degree – 26 funded from State Budget funds and 67 funded through the ESF.

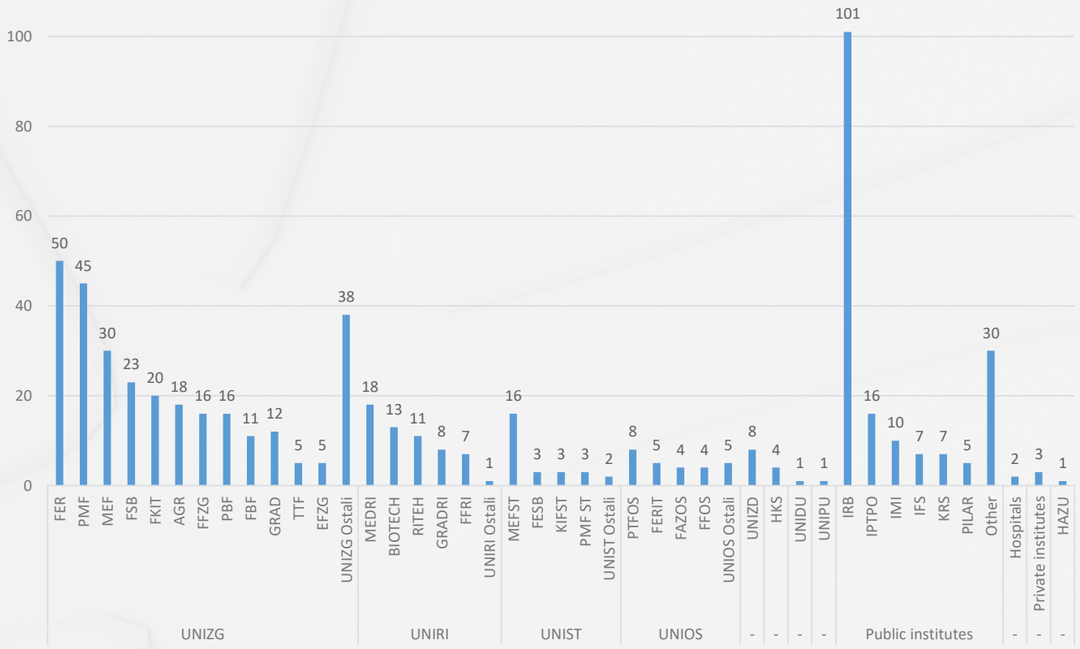


Figure 10. Number of doctoral students funded through the Young Researchers' Career Development Project in 2022 by institution

Doctoral students in numbers (2022)

7 new doctoral students recruited

more than **630** doctoral students monitored, in various stages of their doctoral studies

93 doctoral theses defended

over **70** thesis topics defended

more than **500** published journal papers

more than **150** publications with doctoral students listed as the first or only author

more than **500** conferences attended

1 State Prize for science in the category of young researchers, **1** scholarship "For Women in Science", **4** prizes of the Society of University Professors and Other Scientists in Zagreb and various awards and recognitions of home institutions or professional associations

RESEARCH STORIES

Project title:
New Approach in Development of Vaccine for Congenital Cytomegalovirus Infection

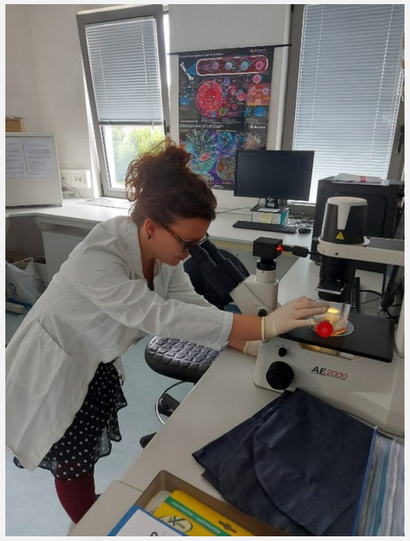
Call:
IP-2018-01

Principal Investigator:
Prof Astrid Krmpotić, PhD

Host Institution:
University of Rijeka Faculty of Medicine

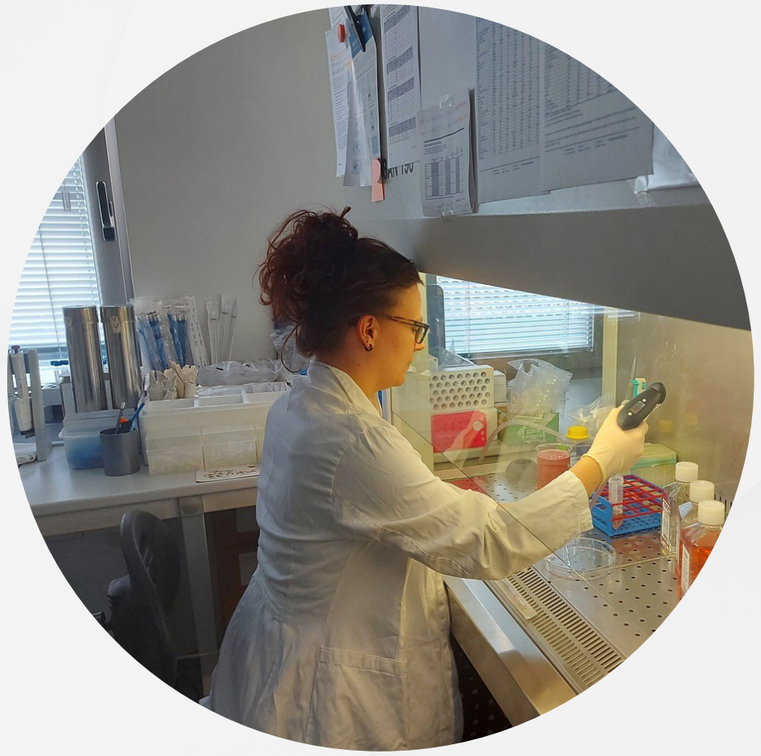
Project duration:
01.01.2019. – 30.04.2023.

Scientific area:
Biomedicine and Health



Human cytomegalovirus (HCMV) is the leading viral agent of congenital infections. Central nervous system (CNS) HCMV infection during foetal development may result in permanent neurological consequences, including brain damage, senso-neural hearing loss and mental retardation. High incidence of consequences of HCMV congenital infection and insufficient antiviral therapy in the peri-natal period make the development of a vaccine against HCMV one of the key priorities of modern medicine. Cytomegaloviruses (CMV) are species-specific and mouse CMV (MCMV) infection is the most commonly used model of HCMV infection. As neonatal mice are developmentally comparable to human foetuses in the second trimester of pregnancy, infection of neonatal mice with MCMV is used as a model of congenital infection with HCMV.

NKG2D is a strong activation receptor for NK cells, the importance of which is reflected in the fact that both HCMV and MCMV have developed numerous mechanisms to avoid NKG2D-mediated control. We identified and characterized MCMV proteins that negatively regulate the expression of NKG2D-ligands MULT1, RAE-1 and H60 and showed that MCMV mutants lacking any of the NKG2D inhibitors were attenuated in vivo due to strong control of NK cells. Since NKG2D is also a co-stimulating receptor of CD8 T-lymphocytes, viral inhibitors of NKG2D-ligands are also important for regulating the antiviral response of T-lymphocytes. Therefore, the insertion of ligands for NKG2D in CMV genome could be used as a new approach in the design of vaccines directed at induction of CD8 T-lymphocyte response. We combined this approach with viral immunosubversive gene deletion and constructed a recombinant MCMV in which NKG2D ligand RAE-1 g was inserted into MCMV genome at the site of its viral inhibitor, showing that this recombinant virus is highly attenuated in vivo, but that at the same time it stimulates a strong and long-term immune response. As part of this project, we have constructed MCMV recombinants expressing two other NKG2D ligands – MULT1 and H60, and we are testing the possibility of using recombinant CMVs expressing different NKG2D ligands as vaccines against congenital CMV infection. We test their immunogenicity, i.e. the ability to induce antiviral antibodies and CD8 T-lymphocytes as well as their protective capacity. We also investigate the safety of use of these viruses as vaccines in immunocompetent and immunodeficient hosts as well as in the model of newborn mice. The ultimate goal of this project is to design a recombinant CMV vaccine that is safe and very attenuated even in an immunity-immature host, while at the same time inducing a long-term protective immune response.



Project title:
Application of innovative techniques of the extraction of bioactive components from by-products of plant origin - By-ProExtract

Call:
UIP-2018-01

Principal Investigator:
Prod Stela Jokić, PhD

Host Institution:
Josip Juraj Strossmayer University in Osijek, Faculty of Food Technology Osijek

Project duration:
02.01.2018. – 31.12.2022.

Scientific area:
Biotechnical Sciences

Each industrial processing entails generation of waste. 60,000 tonnes of tangerines are produced in Croatia annually, and 50% of this mass is waste. Of the 10,500 tonnes of tobacco produced per year, as much as 30% is discarded either in the field or during processing. Even chocolate production heaps large amounts of waste (cocoa shells). Such by-products are usually disposed of, or less frequently used as compost or animal feed.

Amid difficulty lies opportunity.

Citrus waste, especially bark, is rich in essential oils and phenolic compounds such as hesperidin, neohesperidin, neoerythrocin, narirutin, naryngine and tangeritine. Cocoa shell is a rich source of methylxanthin (theobromine, theophylline, caffeine), catechin, epicatechin and caffeine acid. Tobacco waste is rich in nicotine but also solanesole and phenolic compounds, especially rutin and chlorogenic acids.

Okay. We know they're there, but how do we get to them

We can do it very easily, using conventional extraction techniques. They are really quick, they use up a lot of energy and a lot of toxic solvents. This is all very harmful to the environment but also to the person doing it. Ultimately, we get an extract with very little use and high toxicity because we haven't been able to separate the solvent completely.

Is there any other way?

That is the question we love the most. Of course there is – by using innovative extraction techniques. They are green, without harmful effects on humans or the environment.

How come? How come?

By using six innovative green extraction techniques: supercritical CO2 extraction, subcritical water extraction, microwave-aided extraction, ultrasound-aided extraction, cold plasma-aided extraction and eutectic solvent extraction.

And that's it, a super powerful extract with biological activity?

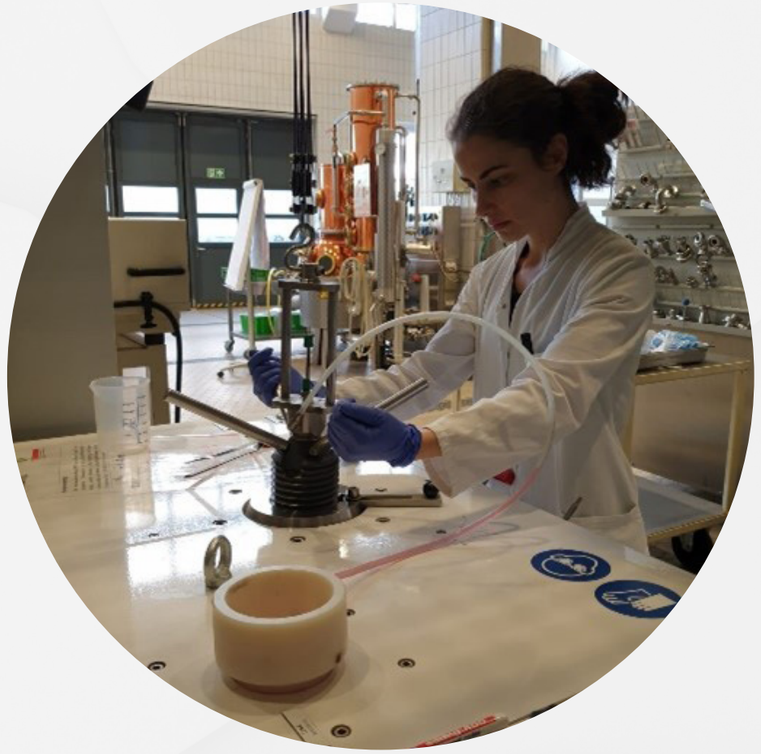
Well, not really. We need to analyse the extract and determine which bioactive compounds it contains and what activities it is capable of. This is all done through a lot of repetitions, after which it should be statistically processed and modelled. Then the liquid form should be translated into powder form using innovative drying techniques, such as freeze-drying and spray drying. Because why use classical when we can use innovative?!

Faster – higher – stronger.

We also do optimization of each extraction process. Which means getting as much extract as possible with the best possible properties using as little energy as possible.

Are we any good at this?

Mostly yes, but sometimes we experience difficulties. But in the 5 years of the project, we published 35 papers, 7 book chapters. These investigations have also encouraged our team members to participate in numerous national and international congresses. We got numerous PhD and Master's degrees. That's not that bad, is it?



Project title:

Croatian School Children's Attitudes About Mathematics: Evaluation and Outreach Strategies for a More Effective Curriculum Reform (MATH ATTDS)

Call:

PZS-2019-02

Principal Investigator:

Assoc. Prof. Ružica Brečić, PhD

Co-Principal Investigator:

Dr Dario Cvenček, University of Washington

Host Institution:

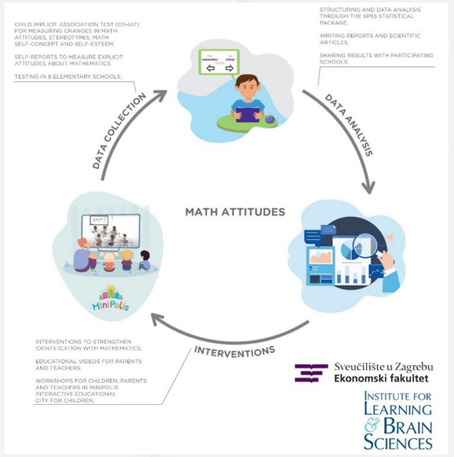
University of Zagreb, Faculty of Economics and Business

Project duration:

01.10.2019. – 01.05.2023.

Scientific area:

Social Sciences



Education is the most powerful tool to change the world. Daily training through formal education is crucial for the development of society and has great importance for anyone who wants to achieve success in their social and professional development. Early acquisition of skills, primarily counting skills, is crucial for further successful career development.

Math Attds is an interdisciplinary project run by economists and psychologists. The project monitors and evaluates the socio-emotional learning of elementary school students and examines changes in attitudes about mathematics, mathematical self-concept and self-confidence of children. The Implicit Association Test and explicit measures (self-reports) are used to measure changes. These measures provide a new way of monitoring positive changes in students' beliefs and attitudes about mathematics over time. As part of the project, methods of simple management of implicit and explicit measures for the assessment of attitudes on mathematics, self-concept and self-confidence were developed and methods adapted for use in Croatia. The combination of implicit and explicit measures provides a useful, standardized metric for quantifying success throughout the school environment during the academic year.

In order to share the results of the project with teachers and parents and to explain their meaning for day-to-day practice with children, new communication strategies are being developed. For this purpose, video materials are produced to help parents and teachers monitor children's learning. Video material transmits the results of research conducted within the project and scientific discoveries by world experts. Video materials are posted on the official website of the project, as well as on YouTube and LinkedIn social networks.

Interventions are also proposed to strengthen the student's identification with mathematics in order to measure how much interventions change the student's implicit and/or explicit views on mathematics and mathematical self-concept. In addition, educational workshops aimed at children, parents and teachers are organized in order to successfully apply the results of this project in everyday practice, all with the aim of encouraging children to use all their potential.

The project is the result of cooperation between the Faculty of Economics of the University of Zagreb and the Institute for Learning & Brain Sciences of the University of Washington.

Project title:

Literary Revolutions

Call:

IP-2018-01

Principal Investigator:

Assoc. Prof. Marina Protrka Štimec, PhD

Host Institution:

University of Zagreb, Faculty of Humanities and Social Sciences

Project duration:

12.11.2018. – 11.05.2023.

Scientific area:

Humanities

The four-year research project "Literary Revolutions" focuses on exploring the legacy of the avant-garde in the literary and social fields. Starting from a critical consideration of the historical avant-garde in the light of new methodologies and approaches, and in the wider Central European and South Slavic context, the project aims to develop basic knowledge and theoretical and methodological paradigms for the understanding and analysis of concepts of literary revolutions founded in the aesthetic autonomy of literature. As the main objective of the project, we consider it necessary to identify the assumptions that enabled the avant-garde literary revolution and describe the textual network of symbolic and political practices that jointly create the revolutionary, emancipative potential of literature, and we are especially focused on its diverse manifestations in the literary texts of canonical authors of Croatian and related literature.

Our research activities and scientific contributions are grouped into three problem focuses:

1. a new description of the poetics of canonical writers (poets, prose writers and dramatists) of Croatian modernism,

2. the discovery of a theoretical and methodological platform for exploring concepts and practices that generate the emancipative potential of literature and further explorations of the history of avant-garde,

3. in light of innovative theoretical approaches, redefining and repositioning the concept of avant-garde in a trans-historic sense in the recent history of literature.

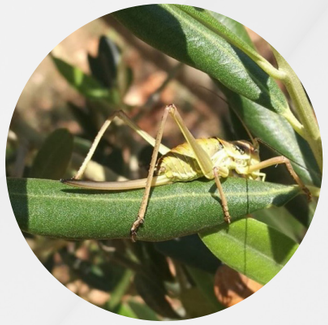
The research combines several disciplines – literary and cultural theory (especially Marxist and post-Marxist, psycho-analytical, feminist and critical theory), literary history, cultural history, intellectual history and aesthetic theory. We combine these theoretical approaches with qualitative research methods such as discourse analysis, textual analysis and related methods (semiotics, psychoanalysis, hermeneutical interpretation) which, along with careful philological processing of the text, allow us new interpretations of literary texts and significant author works of recent Croatian literature.

We have so far carried out a number of core activities: collection of materials, research of literary and historiographic materials and theoretical literature, publication of scientific articles in domestic and international journals in Croatian and English (all in A1 journals, as well as in WoS, CC and Scopus databases), preparation of a thematic block in a scientific journal, participation in international conferences in Croatia and abroad, collection and translation of previously untranslated theoretical literature, organization of a panel on the topic "Literary Revolutions: Avant-garde Heritage in Croatian literature", held on 19 September 2019 at the Faculty of Humanities and Social Sciences, organization of the round table "Problematic networks of revolution-literary relations", held on 4 May 2021 at the Faculty of Humanities and Social Sciences and online. Our future work includes publication of scientific books and proceedings of theoretical texts (all in preparation), dissemination in the form of scientific papers and participation in conferences, and organization of an international conference in the final year of the project with publication of the proceedings.

Project title:
Neonicotinoids and Copper in the Mediterranean Agriculture - their effects on non-target invertebrates through trophic interactions (MEDITERATRI)
Call:
UIP-2017-05
Principal Investigator:
Dr Lucija Šerić Jelaska, PhD
Host Institution:
University of Zagreb, Faculty of Science
Project duration:
01.03.2018. – 28.02.2023.
Scientific area:
Natural Sciences

The Mediterranean area is distinguished by high biodiversity, but also by the high sensitivity of ecosystems to pollution and climate change. Recent research has identified negative impacts of synthetic plant protection chemicals on insect diversity, including pollinators and predators (important in biological control). As part of the MEDITERATRI project, in cooperation with the University of Zadar, we explore the diversity of insects and other arthropods and their nutritional relations in order to determine the benefits that insects provide and how they can contribute to sustainable and environmentally friendly olive and vine cultivation.

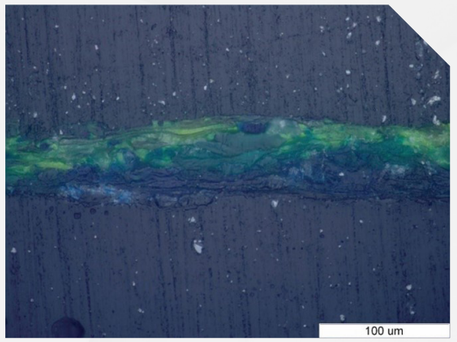
What do predatory insects, earwigs, and spiders eat in Mediterranean agricultural ecosystems? How do we analyse the prey from their digestion organs even after the meal is over? Are some of them really powerful predators that can help us reduce the use of pesticides? Can pesticides harm predators through diet? How can we identify rare and hidden species with eDNA technology?



Detailed nutritional relations in nature can be established today thanks to the development of the latest molecular techniques of DNA sequencing and environmental DNA (eDNA) that we apply in the project in the analysis of arthropod predators' digestion. We want to determine which insects have the potential for biological control, whether there is a transfer of pesticides through diet, and whether the use of certain pesticides has an impact on the survival and diversity of predators and prey. We also want to determine how the husbandry method affects biodiversity in Mediterranean agriculture.

The Farm to Fork Strategy, which is at the heart of the European Green Deal, committed the EU to significantly reduce pesticide consumption and increase production areas in organic production. This strategy encourages research into the effectiveness of biological control and the importance of biodiversity in plant protection, but also encourages farmers to turn to biological methods of protection, the production of healthier products with higher nutritional value and the preservation of the environment. In cooperation with winemakers and olive growers of Zadar County, we have determined the connection between agro-technical

measures and the composition of arthropod predators, impacts on nutritional relations and overall biodiversity. We have made a list of species with great potential in biological control and how they contribute to the sustainable cultivation of olives and vines. We presented the results of our research at more than a dozen international and domestic conferences and published them in the most prestigious scientific journals such as Biocontrol. Many students participate in project activities, in professional practice, in the preparation of final, graduate and doctoral papers. We established cooperation with scientists from the University of Cardiff (UK), Masaryk University in Brno (Czech Republic), the University of Siena (Italy), the Ruđer Bošković Institute and the Faculty of Veterinary Medicine in Zagreb.



Project title:
Printability, quality and utilization of substrates with non-wood fibres

Call:
UIP-2017-05

Principal Investigator:
Asst. Prof. Irena Bates, PhD

Host Institution:
University of Zagreb, Faculty of Graphic Arts

Project duration:
08.01.2018. – 07.06.2023.

Scientific area:
Technical sciences

Paper industry, as one of the largest and fastest growing industries in the world, uses pulp fibres as the basic raw material for paper production. In the cellulose and paper industry, environmentally unacceptable synthetic materials are being increasingly replaced by natural sources or lignocellulosic materials. Wood remains the world's most used raw material for paper and pulp production, but due to the irrational long-term exploitation of this natural resource, its availability has decreased drastically. As the decrease in forest areas reduces the availability of timber and the use of paper products is increasing due to the growth rate of the world's population and their standard of living, it is essential for the paper and graphics industry to find new sources of primary cellulose fibres. Research conducted through this project is aimed at assessing the possibility of using non-wood fibres from straw cereals of the Croatian climate (wheat, barley and triticale) in the development of innovative paper printing media and their usability. Grain straw as an alternative to timber has been selected as a potential raw material because its yield quantity is surpassed only by timber and is a cheap and renewable source of fibres on an annual basis.

Laboratory papers produced under laboratory conditions with different proportions of non-wood fibres from cereal straw are printed using the most widely used printing techniques (digital printing, flexographic printing, offset printing and etching and screen printing) in order to assess their usability for future graphic products (publications, packaging, labels, etc.). Depending on the printing technique used, the physical-chemical properties of the printing ink are changed in order to achieve quality reproduction of the polychrome image and text. In order to achieve quality reproduction of image and text on printed media, the range of light reflection is achieved by raster mixing of the colours of subtractive synthesis (cyan, magenta and yellow and additional black).

The possibility of printing and usability of paper printing media with non-wood primary fibres is considered based on a number of qualitative parameters, and the result of this project is the creation of recommendations and guidelines for a new graphic product, which will improve the field of graphic technology by smart use

of renewable resources. This approach will help prevent the further exploitation of limited natural resources and environmental degradation and ensure a more efficient use of renewable resources.

NEW PHDS

Dr **Najda Rudman,** PhD

Glycosylation is a ubiquitous enzymatic modification of the protein by which complex oligosaccharide structures (glycans) are added to the protein. Several studies of glycosylation changes in plasma proteins in type 1 diabetes have been conducted so far; however, all these investigations included adult subjects and were exploring the association of glycosylation changes with disease complications. The aim of this study is to identify N-glycans of plasma proteins associated with the development of type 1 diabetes and the genes which regulate them.

This is the first study to correlate genes and N-glycome in people with type 1 diabetes. To this end, polymorphisms of individual nucleotides will be analysed using a commercial chip that includes polymorphisms important for the development of immune-mediated diseases. N-glycans of total plasma proteins and immunoglobulin G will be analysed using liquid chromatography followed by a genomic association study. 1,928 samples of isolated DNA and blood plasma collected within three months of diagnosis of type 1 diabetes through the Danish Register of Children and Adolescent Diabetes, as well as 244 samples of healthy relatives, will be used for this.

The expected scientific contribution of this research is to find a new model/tool for identifying children at increased risk of developing type 1 diabetes based on N-glycosylation and genetic data. This will also suggest new potential mechanisms involved in the emergence of type 1 diabetes, which would contribute to understanding the development of the disease itself and propose new potential therapeutic targets.

Doctoral student:
Dr Najda Rudman, PhD
Dissertation title:
N-glycome and genome in comprehension of type 1 diabetes
Supervisor:
Prof Olga Gornik, PhD
Institution:
University of Zagreb, Faculty of Pharmacy and Biochemistryvv
Call:
DOK-2015-10

NEW PHDS

Dr **Martina Kadoić Balaško**, PhD

Doctoral student:
Dr Martina Kadoić Balaško, PhD
Dissertation title:
Genomic changes associated with insecticide resistance in economically important insect pests in Croatia
Supervisor:
Prof. Renata Bažok, PhD
Institution:
University of Zagreb, Faculty of Agriculture
Call:
DOK-2015-10

Insecticide resistance in insects is a serious and growing problem in agricultural production. The production of the most important arable crops (corn and potatoes) and fruit crops (apples) in Croatia is threatened by numerous pests, among which the most important are corn rootworm (Diabrotica virgifera virgifera LeConte), potato beetle (Leptinotarsa decemlineata say) and codling moth (Cydia pomonella L.). All of these species have developed resistance to insecticides (potato beetle and codling moth) or to control strategies (corn rootworm). For this reason, it is necessary to develop effective resistance monitoring programmes, which enable early detection of resistance and the development and timely implementation of anti-resistance strategies or resistance management strategies.

SNPs (Syngle Nucleotide Polymorphism) is a recent method of analysis of the whole genome by determining the polymorphisms of individual nucleotides. An analysis of the genetic structure, differentiation, gene flow, distribution and ability to adjust of the three specified pests will be conducted through genotyping by using the SNPs method. The use of SNPs in non-model organisms has become an accessible and easily accessible tool for generating important data on many species, which would otherwise be impossible due to high costs and often lack of expertise of laboratory staff. The use of SNPs is necessary for a better understanding of the population genetics of all three observed insects. Such data, which imply the identification of genomic changes linked to the development of resistance, are essential for the implementation of anti-resistance programmes as an integral part of integrated pest management.

A total of 16 corn rootworm, 17 potato beetle and 19 codling moth populations will be genotyped. Ten individuals (five male and five female beetles and ten male moths) will be analysed from each population. Each individual will form a single sample in the study. The entire genomic DNA will be isolated from each individual. To confirm that sufficient DNA has been extracted for SNPs analysis, a polymerase chain reaction (PCR) will be performed for each sample followed by electrophoresis (1.0% agarose).

Using a relatively cheap SNPs method representing the analysis of the complete genome, genetic differentiation associated with the development of resistance to insecticides in the populations of corn rootworm and potato beetle and codling moth (biomarkers) will be determined. The existence of such a biomarker detecting a change in the resistance genome would allow rapid detection and monitoring of resistant pest populations and would be the first step in the choice of anti-resistance strategies. This is a new approach to research on genetic changes using innovative techniques of population genetics and certainly provides a new insight into the important area of development and control of insect resistance.

NEW PHDS

Dr **Mario Pintarić**, PhD

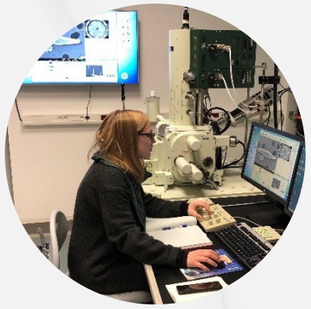
Doctoral student:
Dr Mario Pintarić, PhD
Dissertation title:
Donors and artists active in Rijeka during the 17th and 18th centuries
Supervisor:
Assoc. Prof. Damir Tulić, PhD
Institution:
University of Rijeka, Faculty of Humanities and Social Sciences
Call:
DOK-2018-01

The aim of the doctoral dissertation is to create an exhaustive and analytical catalogue of both art buyers and active art masters in Rijeka and its immediate surroundings in the period from 1600 to 1800. The subject of the doctoral research are altars, sculptures, paintings and applied art objects in churches and monasteries of the City of Rijeka and its immediate surroundings, as well as archival material related to their clients. Archival documents related to clients and orders are investigated, which are located in the State Archives in Rijeka, Archdiocese Archives in Rijeka, Croatian State Archives, Archdiocese Archives in Zagreb, Archives of the Republic of Slovenia, Archivio di Stato in Venice, Archivio Patriarcale in Venice, Archivio di Stato in Trieste, Archivio storico Diocesano in Trieste, Österreichisches Staatsarchiv and elsewhere. It is also important to explore works of art in their original locations in Rijeka and to explore comparative works in different locations in Croatia, Slovenia, Italy and Austria due to stylistic contextualisation and new attributive proposals. The doctoral dissertation will present for the first time in one place the activities , strategy and goals of the art buyers in Rijeka during the 17th and 18th centuries. Apart from offering a more methodologically contemporary interpretation of familiar facts, the text will present a number of completely unknown archival information about the authorship of works, artists, as well as about the clients and the donor climate in the then very prosperous shopping centre in the north of the Adriatic. This doctoral dissertation will contribute to the development of cultural tourism in the Croatian Littoral.

NEW PHDS

Dr **Klara Filek**, PhD

Doctoral student:
Dr Klara Filek, PhD
Dissertation title:
Diversity of diatom and bacterial communities associated with loggerhead sea turtles (Caretta caretta)
Supervisor:
Asst. Prof. Sunčica Bosak, PhD
Institution:
University of Zagreb, Faculty of Science
Call:
DOK-2018-01

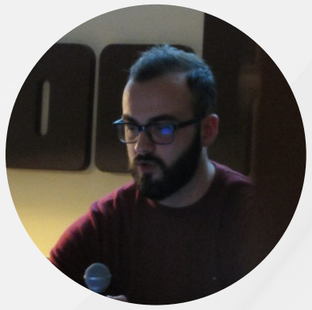


Within the Installation Research Project "Loggerhead turtle (Caretta caretta) microbiome: insight into epizoic and endozoic communities" (TurtleBIOME), Klara is exploring communities of micro-organisms living on the surface and within the digestive system of loggerhead turtles in the Mediterranean Sea. A better understanding of the ecology and physiology of loggerhead turtles through the study of their symbiotic microorganisms can contribute to improving efforts in protecting this endangered species. Klara's work focused on bacteria and diatomaceous communities on the surface of the armour and skin. Bacteria and diatomae are the first colonizers of inanimate and living solid surfaces in the marine environment, including the skin of many marine vertebrates, including loggerhead turtles. Identification and characterisation of unknown species of turtle-specific diatomaceous species is the first step in detecting the impact of microbial communities on loggerhead turtles. In her analyses, Klara will also complement the traditional morphological characterisation of diatoms with molecular phylogenicity through the analysis of genetic markers (SSU, rbcL and psbC genes). It is now known that the composition and activity of microbiomes have a wide impact on the host. The relationships and dynamics between microorganisms within microbiomes are still unknown, especially on sea turtles. Klara's work will also try to characterize the relationship between bacteria and diatoms within biofilms on the backs of turtles, by co-cultivating bacteria and diatoms and by analysing microbial communities of cultures by sequencing 16S rRNA genes. By describing hitherto unknown and intriguing microhabitats, we hope to contribute to the understanding of the entire head turtle holobiont and help in the efforts to protect this charismatic animal.

NEW PHDS

Dr **Martin Gojun**, PhD

Doctoral student:
Dr Martin Gojun, PhD
Dissertation title:
Microsystem for biocatalytic production of biodiesel
Supervisor:
Prof. Bruno Zelić, PhD
Institution:
University of Zagreb, Faculty of Chemical Engineering and Technology
Call:
DOK-2018-01



Biodiesel is one of the most significant alternative fuels, most often produced by chemical transesterification in batch reactors. Due to its physical-chemical properties, it is similar to fossil diesel, but the process of its production and use in internal combustion engines results in a significantly lower negative environmental impact. In order to meet the needs of the market due to the increasing demand for biodiesel, it is necessary to intensify existing production processes whereby the use of microreactors and enzymes as a catalyst has proven to be an efficient and economically justifiable alternative to chemical transesterification. The research consists of carrying out enzymatically catalysed production of biodiesel in different types of microreactors. A commercial lipase enzyme and a lipase enzyme produced by fermentation of Thermomyces lanuginosus will be used as a catalyst on solid carriers that will be further purified and characterised after production. The produced biodiesel will be purified using water and eutectic solvents and the process will be carried out in a micro-separator. Based on the results of optimized biosynthesis and purification processes, a fully integrated process of synthesis of biodiesel from edible and waste oil will be developed using two mass-connected microsystems – one for biosynthesis implementation and the other for biodiesel purification.

HRZZ's activities and science popularization

PhD Café

PhD Café is an activity intended for the promotion of young Croatian scientists funded through the Young Researchers' Career Development Project – Training New Doctoral Students and Installation Research Projects. At each event several doctoral students present their doctoral research and obtained results in an informal surrounding. In 2022, a total of eight PhD Café events were held in Zagreb, two in Split and one in Rijeka and Split each. A total of 50 doctoral students presented their research at these events. Since the launch of this activity in 2020, 28 events were held in four Croatian cities. The list of all previous PhD Café events is available at: https://hrzz.hr/phd-cafe/.

This activity will resume in 2023, on a monthly basis in Zagreb and several times a year in Split, Rijeka and Osijek.

Zagreb PhD Café #15, 05 May 2022

Osijek PhD Café #3, 09 May 2022

Split PhD Café #3, 25 October 2022

Zagreb PhD Café #19, 14 December 2022

Career Paths

Career Paths is a series of webinars jointly organised by the Croatian Science Foundation and the Association of Croatian-American Professionals (ACAP). These webinars featured Croatian scientists, both from Croatia and abroad, who by presenting their career paths, wanted to inspire young researchers and direct them at their own paths. Webinars were held once a month via Zoom. A total of twelve webinars were held between 2021 and 2022, which featured a total of 37 Croatian scientists from various parts of the world. Each webinar was attended by around 50 participants, mostly young researchers. Webinar held on 12 April 2022 was the last in this series since interest for this type of event waned following the lifting of epidemiological restrictions. The list of all previous Career Path webinars is available at: https://hrzz.hr/seminar-karijerni-putevi/.

Information workshops for the Call IP-2022-10

Throughout July 2022, HRZZ employees, in coordination with individual universities, held information workshops for potential applicants to the open Call Research Projects (IP-2022-10). Five of these workshops were held in physical form (at universities of Zagreb, Split, Rijeka, Osijek and Catholic University of Croatia) and one online workshop for potential applicants from universities of Zadar, Dubrovnik, Pula and University North.

Information workshop held at the University of Rijeka, 06 July 2022

Information workshop held at the University of Split, 05 July 2022

Plan of activities in 2023

Pursuant to decisions of the competent ministry and the Croatian Government, the Croatian Science Foundation will participate in four programmes within the National Recovery and Resilience Plan 2021-2026 (NPOO) – in the Mobility Programme and Young Researchers Career Development Programme HRZZ will assume the role of Beneficiary, while in programmes Development Research Grants and Targeted Scientific Research it will assume the role of Implementation Body. For the former two programmes, the Ministry of Science and Education, in its capacity as the Competent Body, launched a Call for Direct Award of Funds to the Croatian Science Foundation as the predetermined sole eligible applicant, with 13 January 2023 as the application deadline. Shortly after this deadline, HRZZ will launch calls for proposals through these two programmes. Calls for the latter two programmes should be published in 2023.

Apart from NPOO calls, HRZZ will launch new calls for Installation Research Projects (UIP), Young Researchers Career Development (DOK) and Support to Researchers for Applying to European Research Council Programmes (ERC). Due to HRZZ's participation in the WEAVE initiative, Croatian researchers that collaborate with researchers from Switzerland or Slovenia will still be able to submit joint proposals to SNSF and ARRS calls, while in 2023 this collaboration should be expanded to also include researchers from Czechia (GAČR) and Germany (DFG). In the second half of 2023, we also expect the launch of a new call of the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP). As part of the Second Swiss grant for the programme period 2023-2029, the Swiss National Science Foundation (SNSF) developed a new funding mechanism called Multilateral Calls for Joint Research Project (MCJRP), which should also be launched in 2023.

Apart from the three ongoing ERA-NET consortia, in late 2022 HRZZ also joined CHIST-ERA, which finances basic research inspired by the use of information and communication technologies (ICT) or at the interface of ICT and other domains, which means that in early 2023 Croatian research teams will also be able to participate in calls of this consortium.

2023 marks the final year of implementation of two programmes funded from the European Social Fund – Young Researchers' Career Development Project (ESF-DOK-2018-01) and Research Cooperability (PZS) as well as the Croatian-Swiss Research Programme (CSRP). Toward the end of their implementation period, HRZZ will organise final conferences for all three programmes, at which results and outcomes of each programme will be presented – ESF-DOK-2018-01 in March 2023, PZS in September 2023 and CSRP in October 2023. We are also planning to publish final programme brochures, providing an overview of results and impact of the project funded within each Programme.

PhD Cafés will resume in 2023, while we are also planning to launch a new series of lectures for promoting the most successful research and installation projects - Scientific Colloquia.

More information on the activities planned in 2023 is available in the Croatian Science Foundation's Work Plan for 2023 available at HRZZ website: https://hrzz.hr/o-zakladi/dokumenti/.

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