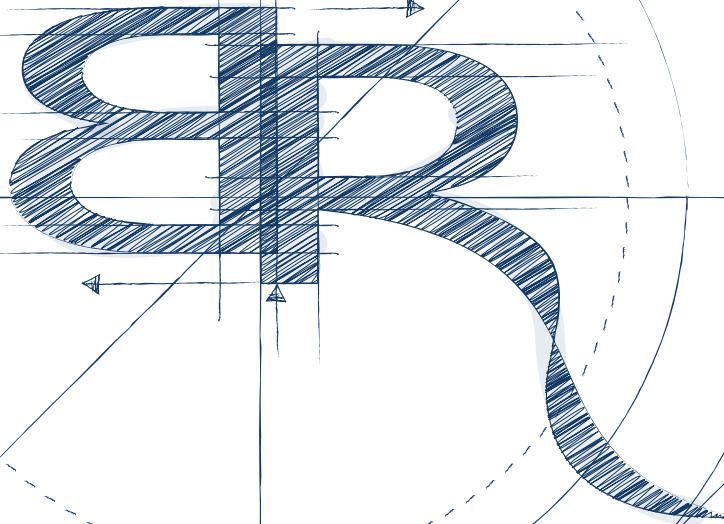
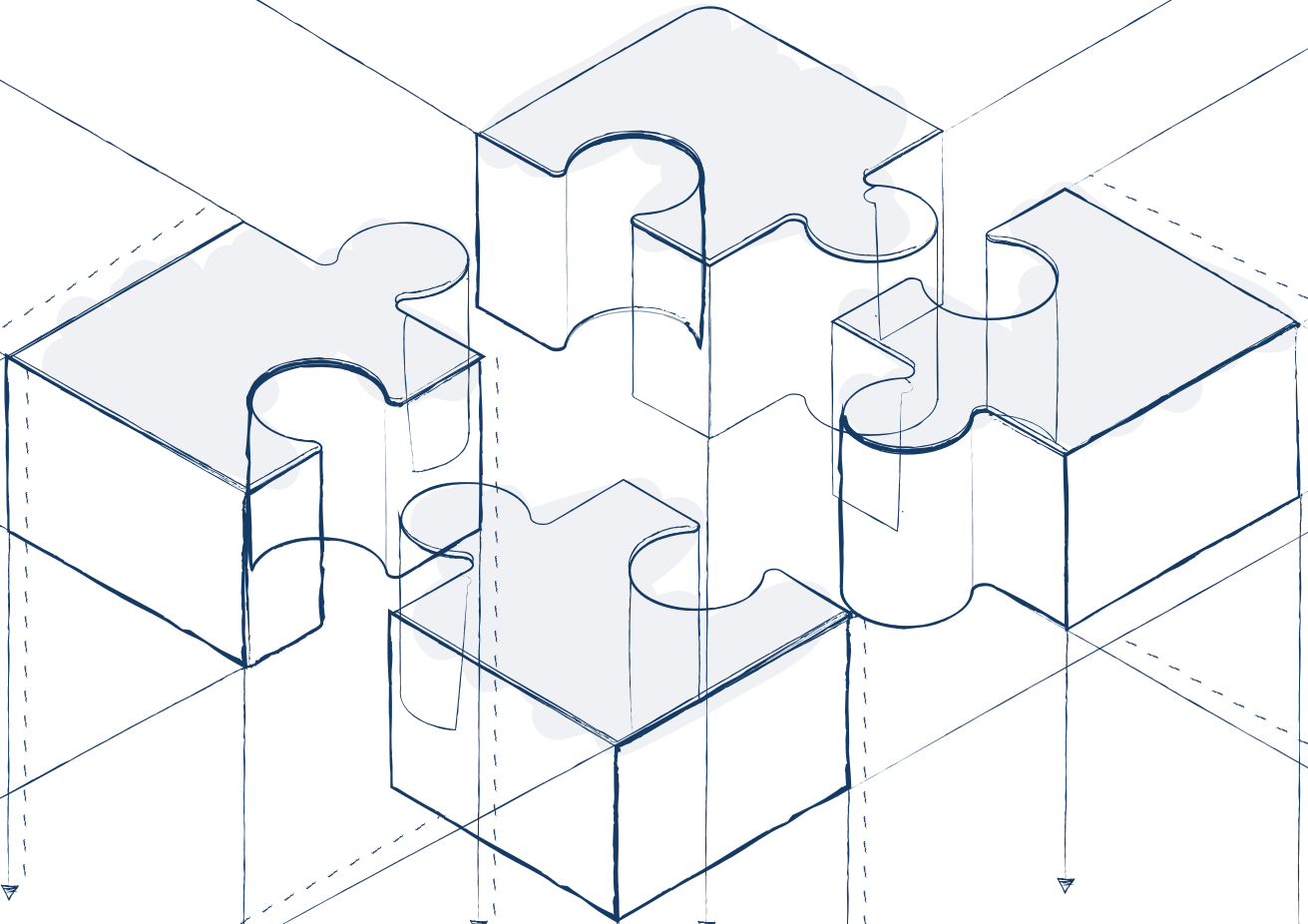


ANNUAL REPORT 2021



2021



Annual Report 2021

Contents

| | |
|---|----|
| Foreword from the Director of the Center | 4 |
| Foreword from the Chairman of the Council | 5 |
| About NCBR - who are we? | 6 |
| NCBR in numbers | 9 |
| Implementation of the new NCBR Strategy | 13 |
| NCBR Group | 17 |
| Highlights | 19 |
| Substantive evaluation process | 23 |
| NCBR beneficiaries in 2021 | 26 |
| Competitions announced in 2021 | 47 |
| „Landscape of Innovation” - NCBR publishing cycle | 51 |
| „Green NCBR” | 54 |
| The Client at NCBR | 70 |
| Summary | 74 |



Foreword from the Director of the Center

Ladies and Gentlemen,

I present to you the Annual Report of the NCBR for 2021. As every year, the Center issues a document in which we share the most important events, processes and achievements that we have managed to work out together over the past twelve months.

2021 was another year in which we had to operate in the era of a global pandemic, economic changes and, importantly for us, at the turn of the perspective of financing research and development projects. It was also the first year of functioning of the new NCBR strategy.

From 2020, the Center switched its activities to hybrid mode. Last year, we improved this process so that our activities could meet the needs of the market and further facilitate the process of applying for NCBR funds. The speed and effectiveness of the actions taken met with great interest from our clients, which translated into the realization of the Center's budget for the implementation of programs at the level of nearly PLN 6 billion.

The past year has been a time of changes at the Center. We have expanded the NCBR Group with a new entity - the AKCES company, whose task will be to support and finance the commercialization of R&D results, broadly understood staff development or increasing the participation of Polish entities in the implementation of international R&D programs.



With the newly adopted strategy, the Center strengthened its position as a Knowledge Hub. In 2021, we released new publications from the „Landscape of Innovation” series, share our expert knowledge, our experience and show economic trends. We have established a Think Tank, whose main area of activity is to support the Center's director and the minister supervising the Center in the process of creating and making strategic decisions.

The year 2021 was exceptional in terms of introducing modern R&D projects into our portfolio. The introduction of the Minesweeper of Innovation allowed to organize undertakings in the formula of innovative public procurement (PCP). These programs are closely related to the implementation of the objectives of the European Green Deal. This activity was recognized internationally, and the Center received the European Commission EUIPA 2021 award.

All the changes that we have proposed and implemented are aimed at increasing the operational potential of the Center. In addition, they are to contribute to the more effective implementation of the tasks ahead. We believe that thanks to your interest in our offer and cooperation with the Center, all planned goals will be achieved, thus building a strong and innovative national economy, able to compete not only on the European but also global market.

I want to thank our partners and clients for their trust. It is thanks to your kindness and cooperation that we achieve our goals at the highest level.

I would like to especially thank the employees of the NCBR Group. It is thanks to your commitment, openness and knowledge that our Institution becomes a modern Center able to meet the most ambitious challenges.

I wish you a good read.

Remigiusz Kopoczek, PhD

Director of the National Center for Research and Development

A handwritten signature in blue ink that reads "Remigiusz Kopoczek".

Foreword from the Chairman of the Council

In 2021, 11 meetings of the NCBR Council were held, which, due to the epidemiological situation, were conducted in the form of videoconferences.

The work of the Council was supported by the Council's Committees for finance, strategic research and development programs, implementation of other tasks of the Center and the Appeals Committee. In the reporting period, the NCBR Council issued 61 opinions, expressing its positions in resolutions.

The past year was devoted primarily to strategic programs that took into account the priorities of the state's science and technology policy and the interests of science and economy.

In the field of water management and the implementation potential of innovative solutions and technologies, the Council gave a positive opinion on the draft Government Strategic Program „Innovations for water management and inland navigation” entitled HYDROSTRATEG. There are three main categories of water problems in Poland related to water shortage, excess and pollution. The way to rationally manage water resources, in view of their significant temporal and spatial variability in Poland, is to increase retention. The Council approved for implementation the 1st competition of the strategic program „New Technologies in the field of energy”. Council members also worked on the preparation of a new strategic program for the so-called functional food, NUTRISTRATEG.

After the analyses performed during the works on the program, the Council decided to launch a national program in this regard and recommended the Ministry of Agriculture and Rural Development to work on a strategic program in the agri-food sector called AGROSTRATEG.

The Center Council also decided to start a new, international pilot program INNOGLOBO, which is an open program that complements the current offer of the NCBR as part of international cooperation. The program will allow Polish applicants a fairly extensive freedom in the selection of a foreign project partner, project subject, and will also enable the implementation of projects with different budgets.

The Council issued a positive opinion on the project of the Joint Undertaking ARTIQ Centers of Excellence in AI (Artificial Intelligence), implemented together with the National Science Center.

Council members supported the signing of a cooperation agreement with the National Research Fund of Ukraine (NRFU).

In line with the Centre's strategy for the coming years, the Council approved the project of a new undertaking, the NCBR Accelerator, planned for implementation within the NCBR Group. The accelerator is part of the tasks and mission of the Center as a government agency carrying out tasks in the field of supporting the innovativeness of the Polish economy. Its operating model focuses on technological business ventures at the initial stage of their development.

Andrzej Stanisławek, PhD, DSc, ProfTit

**Chairman of the Council of the National Center
for Research and Development**



Stanisławek A.



NCBR

- WHO ARE WE?



The National Center for Research and Development is the government's executive agency. The financial support offered by the Center is directed primarily to domestic entrepreneurs and scientific communities. NCBR activities reduce the business risk associated with the development and implementation of breakthrough projects. At the same time, the Center is an institution that encourages both experienced and new entrepreneurs to undertake work on innovations. The NCBR's program offer includes competitions funded from various sources. First of all, these are funds from the European Funds under two important Operational Programs: Smart Growth (OP SG) and Knowledge Education Development (OP KED), where the Center acts as an Intermediate Body. NCBR also finances activities from domestic funds and under international competitions. Each year, we provide our beneficiaries with an average of PLN 5 billion for the implementation of projects. We support Polish entrepreneurs from various industries, regardless of the size of

a given entity. An important place in the offer of the Center is occupied by programs aimed at strengthening the cooperation of scientists with entrepreneurs and supporting scientific units in introducing modern technologies, products and services to the market. Cooperation of scientific units with entrepreneurs in the implementation of R&D projects aimed at solving specific practical problems creates a unique opportunity to overcome barriers resulting from the diverse needs and specificity of these environments. The Center, together with the adopted strategy for the development of the institution for 2021-2025, is becoming a modern government agency, increasing operational efficiency with a wide range of support, a strong international position and the role of a key center of knowledge and competence. All the activities we undertake are aimed at even more effective implementation of the state's policy in the development of innovation and strengthening the Polish economy on the European and global market.

Motto

The future is happening here!

Mission

We create the world of Polish innovation. We are building modern present times and future.

Vision

NCBR is a centre for supporting and developing innovative technological and social solutions, creating an ecosystem of knowledge of, and information about innovation. It organises and implements undertakings contributing to the civilization growth of the country.

Values



Cooperation



Client-centered approach



Trust



Engagement



Development



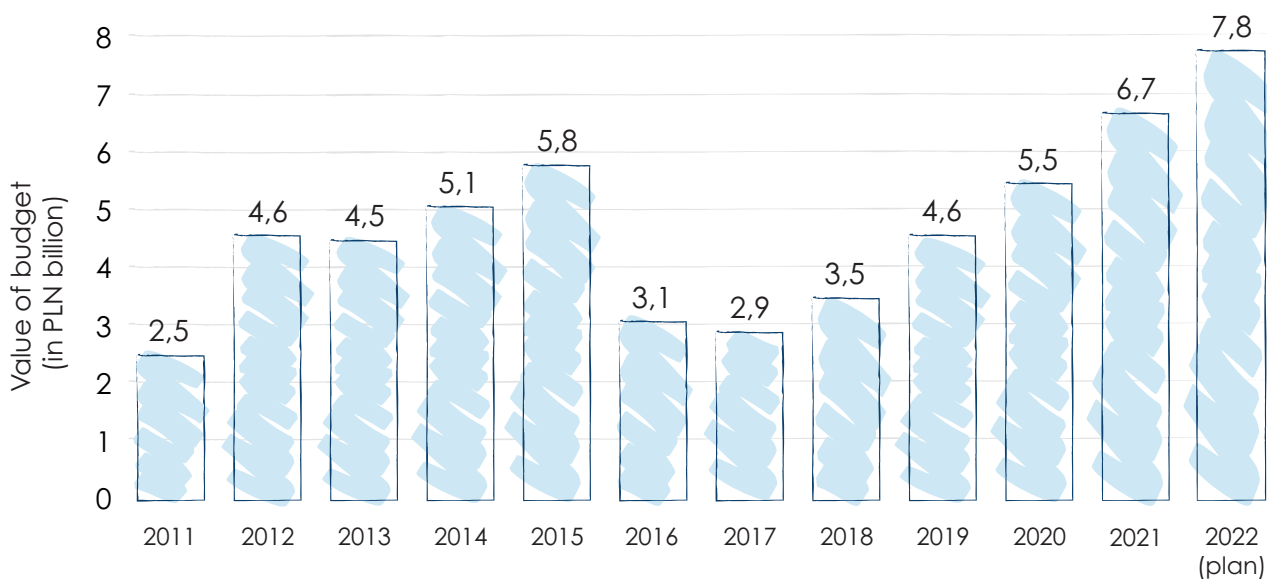
NCBR

in numbers¹

¹ Status as of 31 December 2021



NCBR budget in the years 2011-2021



Realization of the NCBR budget for the implementation of programs in 2021.²

Realization of the NCBR budget for the implementation of programs in 2021

5 883 560 000 PLN

**NATIONAL PROGRAMS
899 466 000 PLN**

**STRATEGIC PROGRAMS
181 566 000 PLN**

STRATEGMED
4 137 000 PLN

BIOSTRATEG
10 662 000 PLN

TECHMATSTRATEG
95 682 000 PLN

GOSPOSTRATEG
63 680 000 PLN

INFOSTRATEG
7 405 000 PLN

**NATIONAL PROGRAMS
411 400 000 PLN**

PATH FOR MAZOVIA
138 681 000 PLN

HOMONYMOUS
HOSPITALS
54 128 000 PLN

INFRASTART
50 000 000 PLN

LEADER
47 883 000 PLN

OTHER
120 708 000 PLN

**DEFENSE AND SECURITY
306 500 000 PLN**

PROJECTS FOR STATE DEFENSE
AND SECURITY
201 915 000 PLN

SAPPHIRE
99 153 000 PLN

YOUNG SCIENTISTS 2/P/2017
5 432 000 PLN

**EUROPEAN FUNDS
4 810 534 000 PLN**

**OP SG
3 661 622 000 PLN**

FAST TRACK
2 042 417 000 PLN

SECTORAL PROGRAMS
234 148 000 PLN

BRIDGE ALFA
211 631 000 PLN

ACTION 4.2
555 062 000 PLN

OTHER
618 364 000 PLN

**OP KED
1 143 286 000 PLN**

INTEGRATED UNIVERSITY
PROGRAMS
2 042 417 000 PLN

INTEGRATED UNIVERSITY
PROGRAMS FOR REGIONAL
DEVELOPMENT
90 783 000 PLN

OTHER
424 478 000 PLN

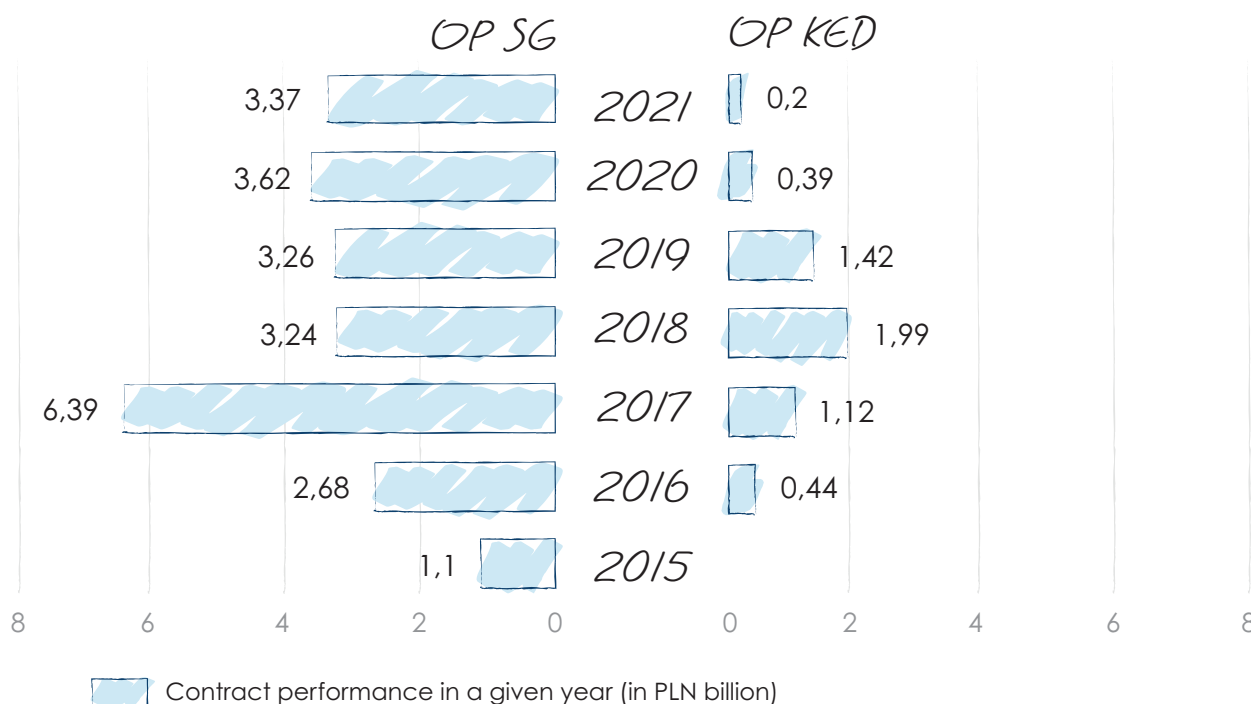
**OPERATIONAL PROGRAM
DIGITAL POLAND
5 626 000 PLN**

**INTERNATIONAL
PROGRAMS
173 560 000 PLN**

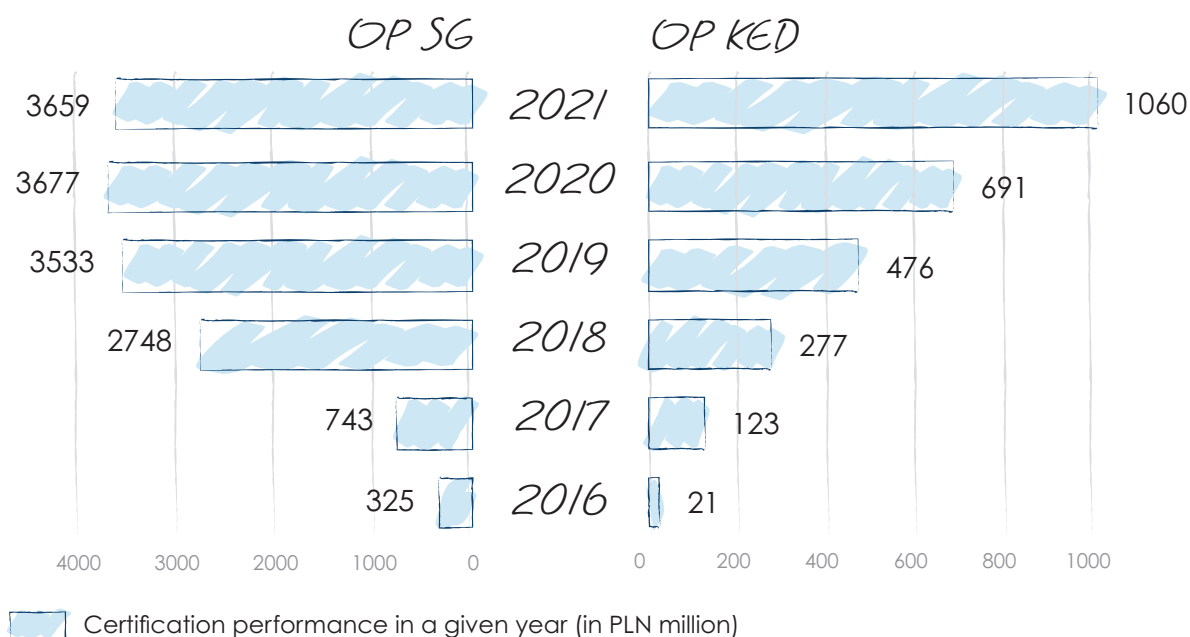


Contracting and certification of OP SG and OP KED

Contracting in 2015 - 2021



Certification in 2016 - 2021





Implementation of the new NCBR Strategy

In 2020, NCBR developed and adopted a new development strategy for 2021-2025. Its implementation is based on the introduction of four main priorities, and on the operational level - on carrying out a number of initiatives and partial strategies. The past year was the first in which we implemented the newly adopted strategy, based on high operational efficiency, a wide offer of support, a strong international position and the role of a key knowledge and competence center. In the first year of operation of the new strategy, the Center can boast of the first concrete achievements that successfully responded to the needs of representatives of the world of business and science.³

High operational efficiency

Despite the ongoing COVID-19 pandemic, the Center has proven to be a flexible institution that can react quickly and adapt to unexpected situations. During the NCBR 2021 Beneficiary Satisfaction Survey, the number of beneficiaries satisfied with their cooperation with the NCBR increased to 67% (in 2020 it was 58%). In the study, the Centre's clients appreciated the shortened time needed to verify the payment claim and reply to correspondence. The satisfaction of our customers is influenced, among others, by the creation and continuous development of the customer ecosystem, which consists of a number of elements and communication tools, i.e. the launch of the Contact Center, the launch of the new website gov.pl/ncbr, appointment of the Center's Representative for Customer Service, up to the development of the Information Point's competences. We have carried out a number of internal initiatives at NCBR to support the implementation of the strategy and introduce changes to the organization. We initiated the process of preparing the institution for ISO 27001 certification, introduced process and project management, and developed a back-to-office process automation system with particular emphasis on the digitization of customer service.

A wide range of support

From the very beginning, the Center took an active part in setting and implementing the goals of the state's innovation policy. Using the experience to date, the Center offers its clients a competition offer that meets the current market trends.

Three editions of the INFOSTRATEG program were launched in the area of digital transformation. Thanks to them, projects supporting the development of the Polish potential of artificial intelligence (AI) are implemented. In response to the challenges posed by the implementation of the European Green Deal strategy, the NCBR implemented 9 innovative, „green” projects financed from European Funds (OP SG). They were conducted on the basis of the innovative procurement strategy „Minesweeper of Innovation” developed at NCBR. In 2021, it was recognized with the international European Innovation Procurement Award (EUIPA) in the competition of the European Innovation Council.

In July 2021, the National Center for Research and Development launched the innovative strategic program „New technologies in the field of energy”. Almost PLN 380 million was allocated in the first competition for the implementation of innovative projects in the field of wind energy and hydrogen technologies. In December 2021, the governmental strategic program Hydrostrateg „Innovations for water management and inland navigation” was approved. The main objective of the Program is to implement new solutions to improve the efficiency of water resource management in Poland. The program concerns innovation in the field of water management and will have a fundamental impact on the present and future of Poland's economic development. The year 2021 also brought the final of the first open technology competition for innovators in Poland „The Grand Challenge: Energy” (WWE), organized by NCBR in the Grand Challenge formula, financed from European Funds (OP SG). The aim of this initiative was to select the best technology for obtaining electricity from wind in domestic conditions.

Last year, the Center initiated a number of activities related to the energy transition. On the initiative of NCBR, framework agreements on cooperation in supporting the development of green technologies were signed with a number of public institutions - the National Fund for Environmental Protection and Water Management, Bank Ochrony Środowiska, Polish Development Fund and PFR Ventures.

The main goal of these projects is to achieve the synergy effect in the public sector and to create a green technology-friendly ecosystem in Poland

³ Strategy available at gov.pl/web/ncbr/ncbr

at every stage of their development. In 2021, the NCBR also conducted consultations in the field of preparations for the implementation of new European programs for 2021-2027: European Funds for Modern Economy - FENG (successor of the Smart Growth Operational Program) and European Funds for Social Development - FERS (successor of the Operational Program Knowledge Education Development) and the participation of NCBR in servicing the module dedicated to the Circular Economy under the National Reconstruction Plan (KPO). The NCBR was working on the program implementation system.

Strong position on the international stage

The Center is consistently developing its support offer for Polish entities willing to participate in international research and development projects. In April 2021, the conference „Europe. Horizon of Opportunity” was held. Throughout 2021, the National Contact Point of the NCBR conducted about 80 webinars on international cooperation, attended by nearly 8,000 participants.

As part of the joint advisory and information activities conducted by the NCBR in partnership with Business & Science Poland (BSP), 45 events took place in the NCBR Office in Brussels in 2021, and in November, the first networking meeting „Back2Business: Research and Innovation” took place. We periodically publish articles the European Commission - Since Business website about the most important initiatives and activities of NCBR.

In January 2021, the NCBR concluded an agreement with the Ukrainian agency NRFU, opening the possibility of organizing competitions for Polish - Ukrainian research projects. In June 2021, NCBR was admitted to the group of members of the European network of TAFTIE (The European Network of Innovation Agencies), thus gaining access to the knowledge and experience of similar foreign agencies, as well as networking opportunities in new international initiatives and projects.

In July, the first call for proposals under the INNOGLOBO Program was launched. Participation will make it easier for Polish entities to establish cooperation with a wide range

of foreign partners. In 2021, NCBR started the implementation of 10 partnerships co-financed under Horizon Europe and launched the first competitions for international research projects.

Key center of knowledge and competence

In June 2021, by the decision of the director of the Center, the NCBR Think Tank was established. The main area of activity is supporting the director of the Center and the minister supervising the Center in the process of making strategic decisions, setting directions of activities and programs in the broadly understood sphere of innovation. Think Tank consists of eminent representatives of the world of science and business.

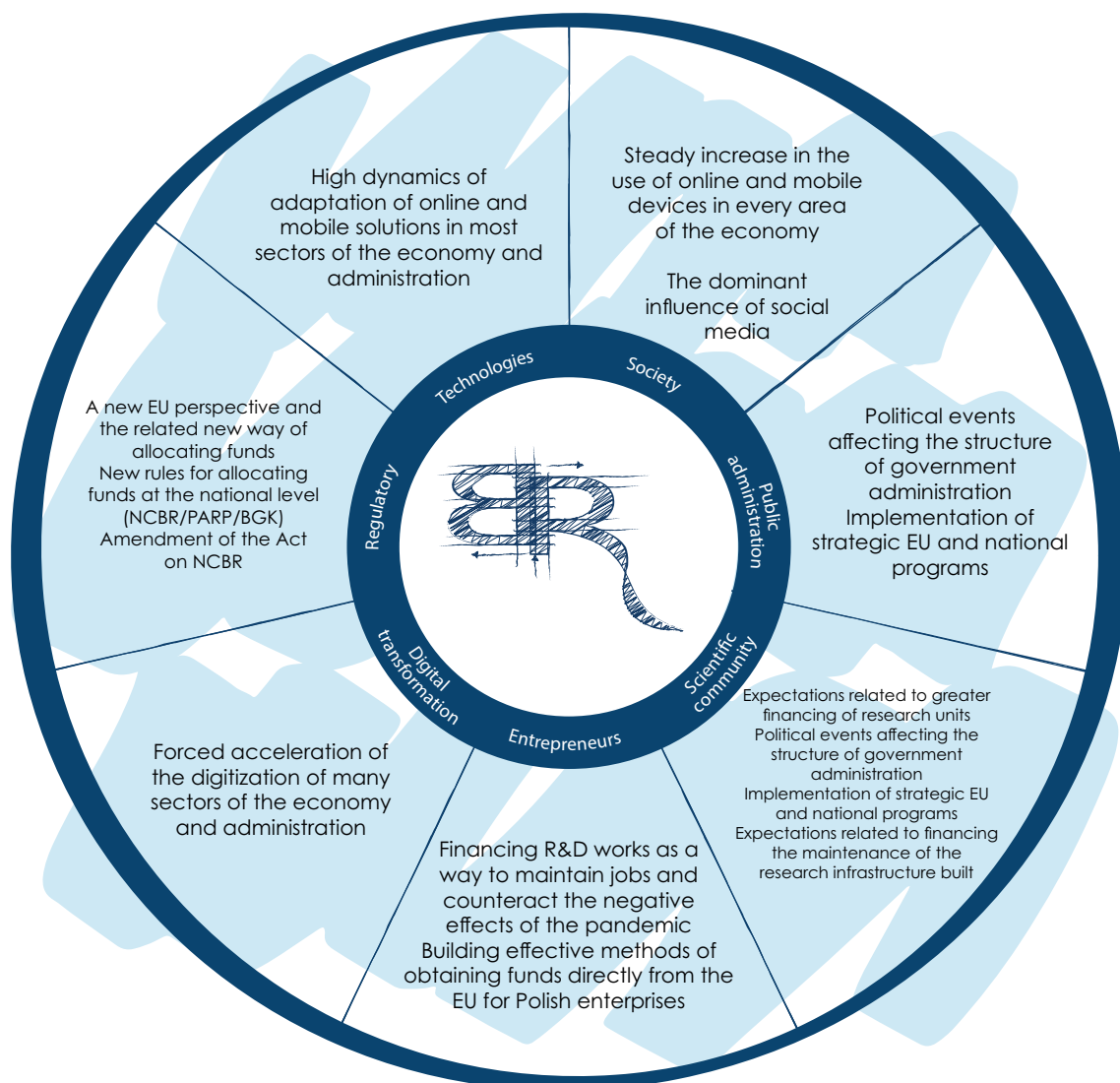
In 2021, the Center organized the first conference „Horizon of Innovation”. The participants of the event were leaders of the scientific community, key representatives of public administration and the business world. The success of the event is evidenced by the total number of conference participants, discussions and online participants, which amounted to almost 5000 people.

The „Landscape of Innovation” publishing cycle is another activity of the Center in the area of sharing professional and unique knowledge. In 2021, we published and distributed three new publications from the „Landscape of Innovation” series: „Public Aid. Effects of implementing the Aid Program in 2014-2019”, „ International R&D projects at the NCBR. Application, implementation, success”, „Closer to the market, closer to modern solutions. Pre-commercial Procurement and Innovative Partnership in the NCBR practice”. In addition, the Center issued an important summary of its spheres of activity „Financing R&D in large companies and the absorption potential in the next financial perspective”. The Center has prepared, together with the Startup Poland Foundation, PFR Ventures and in cooperation with Google for Startups, the „Golden Book of VC 2021” report showing how the rules of functioning of venture capital funds in Poland have changed after the pandemic.



Market diagnosis

An important element of the strategy is to build a strong position of the NCBR in the innovation ecosystem for effective and efficient response to development and transformation challenges. The change that is being carried out is of an evolutionary nature. We are successively building a modern institution that will be able to quickly respond to market needs.





Group
NCBR

The tasks of the NCBR are carried out by five entities - Centrum and its subsidiaries: NCBR+ Sp. z o.o., NCBR Investment Fund, IDEAS and the Akces company. These entities form the NCBR Group.⁴

NCBR+ sp. z o.o. is a private entity established in January 2018 to support the implementation of the statutory objectives of the National Center for Research and Development - the sole shareholder of the company. The company is a provider of professional services in the field of administrative services, HR services, legal advice, public relations, IT services and accounting-controlling services, as well as provides comprehensive support in the implementation of recruitment and supervision processes over projects financed and co-financed by the Center. Currently, NCBR+ provides services to the National Center for Research and Development and other entities operating within the NCBR Group.

NCBR Investment Fund ASI S.A. (Fund) is a co-investment venture capital fund belonging to the National Center for Research and Development. The fund specializes in investments in the SME sector in the growth or expansion phase, commercializing the results of research and development (R&D&I). The annual investment budget of the Fund is over PLN 100 million, and the value of a single investment is from PLN 3 to 64 million.

IDEAS NCBR Sp. z o. o.

The company will directly implement R&D&I tasks in one of the most promising sectors, which is currently the area of artificial intelligence (AI). The organizational form of the new venture - a limited liability company - provides great freedom in undertaking various types of initiatives in order to optimally use the accumulated scientific potential, experience and competences. At the same time, it enables the use of the NCBR

Group's potential in terms of cooperation with business, support for commercialization of the results of implemented projects and expert knowledge. The company's operations will also guarantee a greater influence of the NCBR on determining the directions of R&D&I works in the field of AI, with particular emphasis on the digital economy.

In December 2021, another entity of the NCBR Group began its operations - the accelerator **Akces NCBR**. The newly established company Akces NCBR Sp. z o.o., owned by the NCBR, will focus on comprehensive acceleration, cooperation with business mentors and international cooperation aimed at internationalization of the prepared solutions and projects. When establishing another entity, NCBR aims to create conditions for incubation and acceleration of R&D projects in the area of venture capital. By focusing on assistance for R&D projects, the scope of which includes advanced technologies with a significant research and development contribution, NCBR responds to the need to support market entities ready to commercialize their R&D results. Akces NCBR Sp. z o.o. will support NCBR in the field of: financing activities preparing for the implementation of the results of scientific research and development works and supporting the commercialization of the results of scientific research and development; supporting the development of scientific staff by creating an environment that facilitates the commercialization of the R&D results of its members, in which these people will be able to gain competence (through training) and substantive support (through mentoring) necessary for successful commercialization; encouraging entrepreneurs to invest in scientific activities; participate in the implementation of international research and development programs.

⁴ More about the NCBR Group and the activities of NCBR at gov.pl/ncbr.



Highlights of 2021

„Minesweeper of Innovation” and the EUIPA Award

In response to the challenges posed by the implementation of the European Green Deal strategy, the NCBR implemented 9 innovative, „green” projects, financed by European Funds from the Smart Growth Operational Program (OP SG). They were conducted on the basis of the innovative procurement strategy „Minesweeper of Innovation” developed at NCBR. In 2021, it was recognized with the international European Innovation Procurement Award (EUIPA) in the competition of the European Innovation Council. As part of the „Minesweeper of Innovation” NCBR carried out the following initiatives: Treatment plant of the future, Innovative biogas plant, Energy and process-efficient construction, Electric energy storage, Storage of heat and cold, Ventilation for schools and homes, Home retention technologies, CHP plant in the local energy system, Heat plant of the future, i.e. a RES heating system.

Final of the „Grand Challenge: Energy”

In October 2021, PGE Narodowy in Warsaw hosted the finale of the Grand Challenge: Energy competition, the first competition in Poland referring to the American Grand Challenge initiated in 2004 by the research agency DARPA. The main prize, PLN 1 million, was won by the MMB Team from Gdańsk, led by Prof. Zbigniew Krzemiński, for the best prototype of a home wind farm. The „Grand Challenge: Energy” competition was financed by European Funds from the OP SG.

Energy transformation

The energy transition is a challenge that requires extensive cooperation between the public and private sectors. On the initiative of NCBR, in 2021 framework agreements were signed on cooperation in supporting the development of green technologies with a number of public institutions. National Fund for Environmental Protection and Water Management, Bank Ochrony Środowiska, Polish Development Fund and PFR Ventures,

according to the specifics of their activities, will consult each other on their activities in this respect with the Center. The aim is to achieve the synergy effect in the public sector and to create an ecosystem friendly to green technologies in Poland at every stage of their development.

NCBR conference „Horizon of Innovation”

„Horizon of Innovation” - the most important NCBR conference in 2021, during which experts recognized in Poland started a discussion on the development of innovation, new technologies, international cooperation, became a platform for the exchange of ideas, knowledge and good practices in the area of creating and implementing innovations. It is also a place to discuss increasing Polish participation in the Horizon Europe program and to reflect on the design of tools supporting innovation on the eve of the launch of the new financial perspective of the European Union, the programs: European Funds for Modern Economy and European Funds for Social Development, which are the successors of the Smart Growth and the Knowledge Education Development programs.

New headquarters of NCBR

We chose a new headquarters, which reflects the changes taking place in the NCBR, and is synonymous with: modernity, innovation, Hi-Tech and quality. In the second half of 2022, we will be available to our clients in the Varso Tower building in Warsaw.

„Back2Business: Polish Research and Innovation”

The first official networking event of the NCBR Office in Brussels, operating jointly with Business & Science Poland, entitled: „Back2Business: Polish Research and Innovation”. The event was devoted to the presentation of the Polish R&D funding system of the international community in Brussels and informal talks among Polish and foreign experts in the field of research and innovation.

Conference „Europe. Horizon of Opportunity”

NCBR is consistently developing its support offer for Polish entities willing to participate in international research and development projects. In April 2021, the conference „Europe. Horizon of opportunity” was held. EU Commissioner for Innovation, Research, Culture, Education and Youth, Mariya Gabriel, participated among other distinguished guests.

Agreement between NCBR and the National Research Fund of Ukraine (NRFU)

In January 2021, the NCBR concluded an agreement with the Ukrainian agency NRFU, opening the possibility of organizing compe-

titions for Polish – Ukrainian research projects. The National Research Fund of Ukraine is a state government agency whose main goal is to support the implementation of basic research and development work in priority areas of science and technology. NRFU was established by the Council of Ministers of Ukraine at the beginning of 2018 and is the counterpart of NCBR in Ukraine. The NCBR-NRFU agreement will be in force for 5 years. Collaboration may be undertaken in the field of nuclear research, new materials, IT technologies, physics and astronomy, engineering, biotechnology or environmental research.



The most important processes in 2021

Implementation of the NCBR strategy

In November 2020, the NCBR strategy was adopted. Its implementation is based on the implementation of four priorities, and at the operational level - on carrying out a number of initiatives and partial strategies. In each of the four priorities adopted: high operational efficiency, a wide range of support, a strong international position and the role of a key knowledge and competence center – The center can already boast of concrete achievements in 2021. All this to better respond to the needs of entrepreneurs and universities as well as the challenges facing the Polish market of innovators.

Preparation of NCBR for ISO 27001 certification

We work on ensuring information security, by preparing the NCBR for ISO 27001 certification, we have developed a business model for our operations. The ISO 27001 certificate informs our clients about the use of internationally recognized and accepted standards in the information processing processes, while maintaining their confidentiality and security.

New programs

In July 2021, NCBR launched the innovative strategic program „New technologies in the field of energy”. Almost PLN 380 million was allocated in the first competition for the implementation of innovative projects in the field of wind energy and hydrogen technologies. In December 2021, the governmental strategic program Hydrostrateg „Innovations for water management and inland navigation” was approved. The main objective of the Program is to implement new solutions to improve the efficiency of water resource management in Poland. The program concerns innovation in the field of water management and will have a fundamental impact on the present and future of Poland's economic development.

The first INNOGLOBO competition allows financing of projects related to various thematic areas, including atypical themes. The only requirement for applications submitted in the call for proposals is to adjust the thematic scope of the project to the current list of National Smart Specializations.

FENG and FERS

In 2021, NCBR conducted consultations on the preparations for the implementation of new European programs for 2021-2027: European Funds for Modern Economy - FENG (successor of the Smart Growth Operational Program) and European Funds for Social Development - FERS (successor of the Operational Program Knowledge Education Development) and the participation of the NCBR in servicing the module dedicated to the Circular Economy under the National Reconstruction Plan (KPO). NCBR was working on the program implementation system.

„Landscape of Innovation” publishing series

Throughout 2021, NCBR shared its knowledge and competences through publications in the series: „Landscape of Innovation”. The Center has published successive summaries of important spheres of its activity: “International R&D projects at NCBR. Application, implementation, success.”, „Public Aid. Effects of implementing the Aid Program for 2014-2019” and „Closer to the market, closer to modern solutions. Pre-commercial procurement and Innovative Partnership in the NCBR practice”. In 2020, we published the first publication in the series „Landscape of Innovation - Analysis of research trends in applications for funding submitted to the NCBR under the OP SG in 2016-2019”.



Substantive evaluation process of projects at NCBR

Experts cooperating with the Center play an important role in the substantive evaluation of projects submitted in calls for proposals announced by the NCBR. Experts carry out a number of tasks, ranging from selecting the project to finance and implement, participate in the substantive evaluation of applications for financing, give opinions on reports submitted by beneficiaries and applications for changes at various stages of project implementation, or make other expertise and opinions for the needs of NCBR.

Each project that passes the verification of formal conditions is subject to substantial evaluation. The evaluation is carried out in accordance with the criteria specified in the regulations of a given competition. Projects are assessed by specialists in the field covered by the project. Experts are mostly selected from the NCBR Expert Database, and in the case of programs for state security and defense, additionally indicated by the relevant ministries. Among them are renowned scientists, specialists in the field of economy and finance, employees of advisory institutions and venture capital funds. Some of the NCBR experts are also foreign specialists who provide their knowledge and international experience.

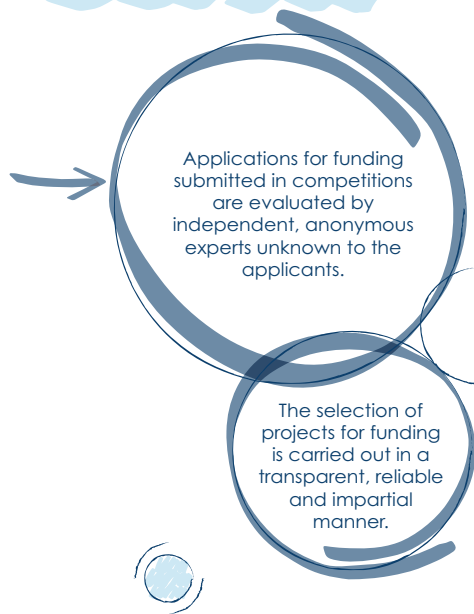
The project appraisal procedure is different for each type of program. However, it usually consists of a written review stage and/or a panel evaluation stage where a group of experts jointly assesses the project during a meeting. Depending on the program, participants of the expert panel may meet with the applicant, who then has the opportunity to present their project and to answer experts' questions or doubts. Other instruments also include a negotiation stage that finalizes the final score of the project.

In the case of written reviews, the principle of anonymity is applied, i.e. the applicant does not know the identity of the experts evaluating the application. In addition, each expert, before receiving the project documentation from the NCBR (i.e. the application with attachments), must exclude the existence of a conflict of interest and sign a relevant statement to confirm it, under pain of criminal liability. The expert and employees of the NCBR undertake to maintain

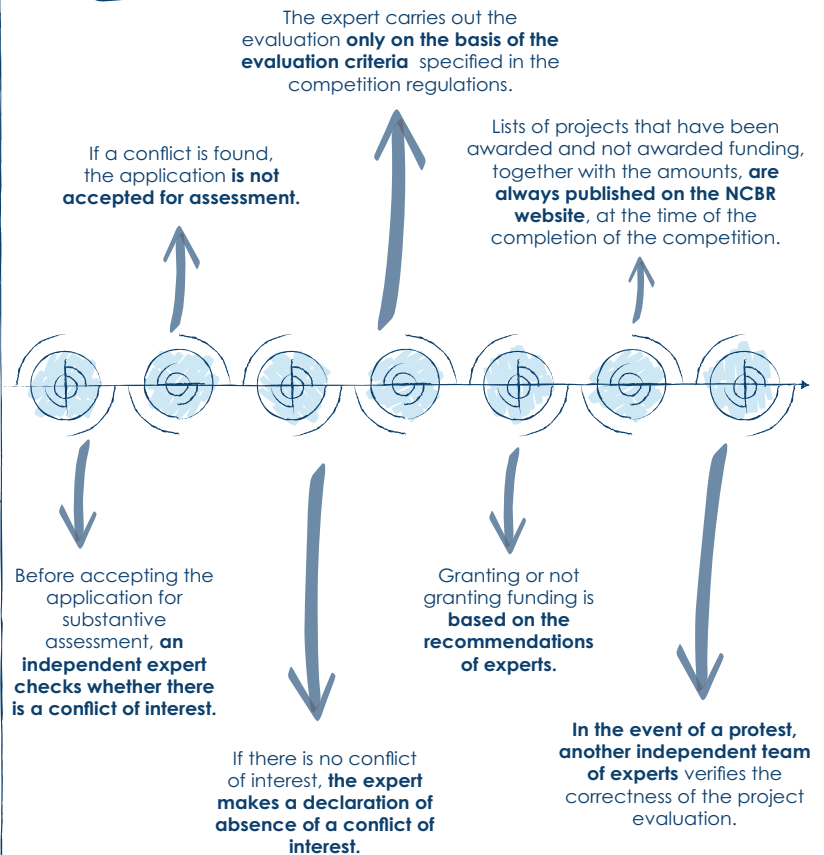


the confidentiality of all information that they obtain in the course of the assessment and undertake not to use it in any way unrelated to the assessment performed. As a result of the assessment, the project may be assessed positively or negatively, and the NCBR each time informs the applicant about granting or not granting funding. If the assessment is negative, apart from justifying it, the applicant also receives instructions on the possibility of lodging a protest or appeal. An applicant participating in a given competition has the right to access documents related to the evaluation of the application submitted by him, while maintaining the principle of anonymity of the evaluating persons.

NCBR application assessment model



How do experts evaluate the applications?





NCBR beneficiaries in 2021



In this year's Report, we present to you selected successes of our beneficiaries who managed to complete projects financed by the Center. NCBR is an Intermediate Body in two large Operational Programs: Knowledge, Education, Development (OP KED) and Smart Growth (OP SG). In addition, we implement a number of international initiatives, competitions for national defense and security, and competitions funded by domestic funds. Thanks to the support of NCBR, every year innovative products, technologies and services enter the market, developed by the beneficiaries of the Center in their completed projects. Largely thanks to the funds from the European Funds, the domestic economy strengthens its international

position by competing not only with European but also global markets. New technologies are not only innovative solutions, but also new jobs, increasing Poland's position in the international arena and improving the quality of our lives. Solutions developed by NCBR beneficiaries are increasingly gaining recognition in the world and are used in the world's strongest economies.

In this part of the report, we present to you selected projects implemented by NCBR beneficiaries in 2021, broken down into projects financed from European Funds, under international programs, state defense and security programs and national programs.⁵

5 More information about the successes of the beneficiaries at <https://www.gov.pl/web/ncbr-en/successes-of-beneficiaries>.

EUROPEAN FUNDS

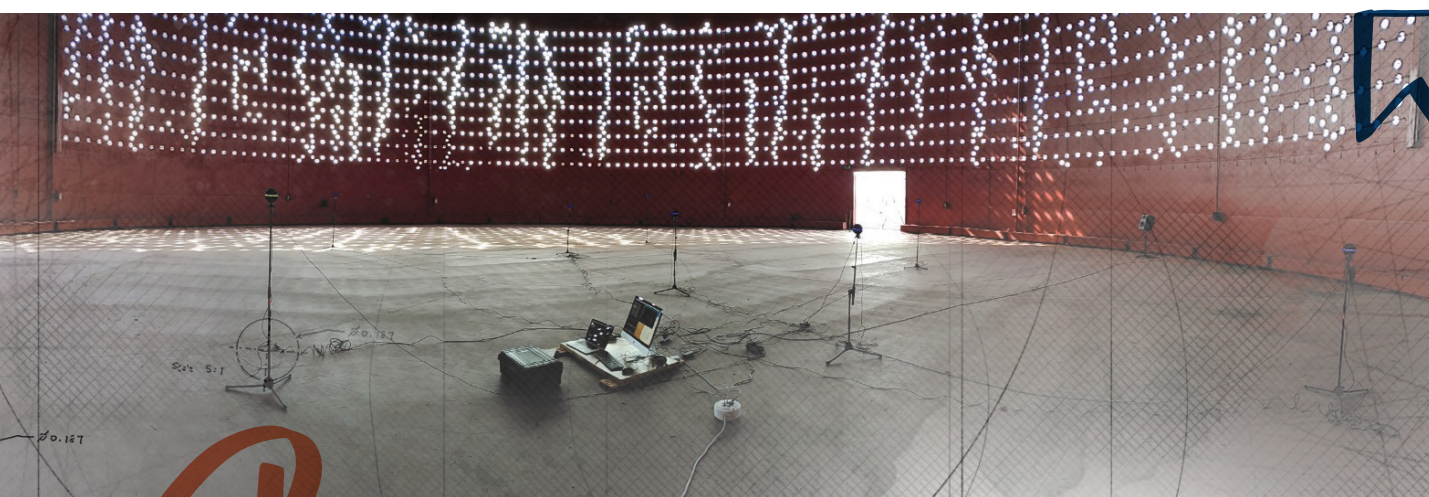
Smart Growth Operational Program (OP SG)

The Smart Growth Operational Program is the largest program financing research, development and innovation in the European Union. With it, entrepreneurs and scientists obtain funding for, among others, R&D

joint ventures and the results of R&D works find practical application in the economy. From idea to industry - this is the main assumption of this program. This means supporting the emergence of innovations from the creation of concepts for innovative products, services or technologies, through the preparation of prototypes, pilot lines, to their commercialization.

Revolutionary tools and technologies for recording and post-production of music, 3D sound and Virtual Reality.

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|---------------------|---|
| Beneficiary: | Zylia |
| Project title: | ZYLIA – a music recording and production system using surround sound and virtual reality techniques |
| Competition: | Fast Track |
| Project value: | 3 607 532.56 PLN |
| Value of financing: | 2 740 583.48 PLN |





WHAT PROBLEM DOES IT SOLVE?

Please imagine a situation where we can go virtually to a concert of the Berlin or Vienna Philharmonic and, thanks to the technology developed in this project, sit virtually in the 2nd row. Another person can choose the thirteenth row, and still someone else can stand between the musicians or in the conductor's place. Changing the place changes the acoustics, noises, sound direction, but also the video. It changes our perception and experience. The listener moves virtually to the concert venue and experiences such impressions and emotions as if they were in the concert hall. Recordings recorded with the ZYLIA 6DoF Navigable Audio system are a kind of representation of the sound stage in the form sampled with many microphone arrays of the sound recording space. This representation is an input to the 6DoF renderer - software that appropriately processes audio data and enables sound reproduction on various playback systems, e.g. on multi-speaker installations (multi-channel sound) or headphones (binaural sound). The renderer additionally takes into account information about the position and rotation of the listener moving in a virtual stage (e.g. a virtual museum, forest or concert hall). Thanks to this, the renderer controls the sound reproduction process in such a way that the listener has the impression of actually being in

the recording place and is able to move freely in this space. The listener can go to the stage where the artists perform, and even go on it and stand next to any musician of their choice. They can walk around the recorded car or go inside and check if the car is noisy. In each moment the coming sound will be slightly different, as it would be in reality.

WHO BENEFITS FROM THE PROJECT?

The product is intended for:

- top audio laboratories developing 3D technologies and the latest MPEG-H 3D Audio and MPEG-I Immersive Audio standards
- volumetric recording studios
- audio engineers who create sound for 360° movies, virtual reality and surround sound
- professional musicians and artists who want to stream their concerts in a way that has been unavailable so far - so that each of their listeners will feel like at a live concert
- concert organizers interested in transferring the viewer into virtual reality
- gaming industry developers who create realistic soundstages
- artists and creators of the virtual reality and augmented reality (VR / AR) industry

An innovative system for monitoring the patient's health condition through the constant remote and automated measurement of the temperature inside the wounds.

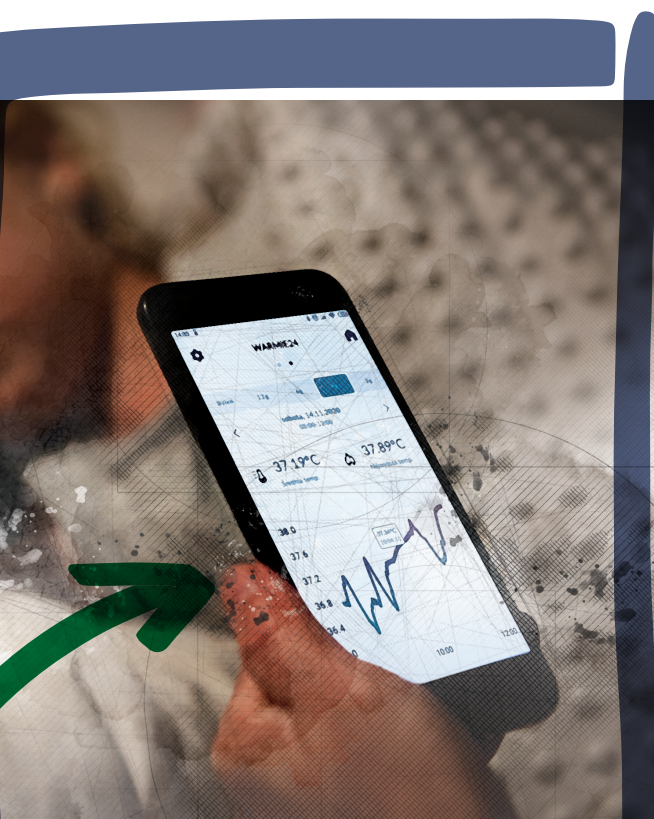
| | |
|----------------------------|---|
| Beneficiary: | WARMIE SP. Z O.O. |
| Project title: | WARMIE - Wireless system for detecting and monitoring changes inside wounds |
| Competition: | Bridge Alfa |
| Project value: | 1 000 000.00 PLN |
| Value of financing: | 800 000.00 PLN |

WHAT PROBLEM DOES IT SOLVE?

The WARMIE system developed as part of the project solves the need to monitor the patient's health on the basis of continuous measurement of temperature and wound environment in a remote and automated manner. The system is designed to support and improve the work of medical personnel - the results of temperature measurements of all patients in a given ward are available in one place, on the screen of one monitor, and this data can be presented and analyzed in terms of changes over time.

WHO BENEFITS FROM THE PROJECT?

The system can be used in hospital conditions for prophylaxis, diagnostics and therapy, and thanks to remote functionality - also for monitoring the health of patients. Continuous temperature monitoring will enable quick identification of postoperative complications (over 2 million surgical procedures are performed annually in Poland alone), and therefore may contribute to reducing the cost of patient treatment and hospitalization time. In addition, a device aimed at the consumer market was also created, which will allow to control health by monitoring the temperature - it is intended for people who care about their health and for their relatives, in particular for parents of young children and caregivers of the elderly and chronically ill.



OPERATIONAL PROGRAM DIGITAL POLAND (OP DP)

The Operational Program Digital Poland (OP DP) is an initiative aimed at strengthening the digital foundations for the socio-economic development of the country, including widespread

access to high-speed internet, effective and user-friendly public e-services and the constantly growing level of digital competences of the society.

High quality of medical services and reducing the level of stress in patients is the response of the University Clinical Center in Gdańsk to the needs of an efficient process of providing medical services.

Beneficiary: University Clinical Center in Gdańsk

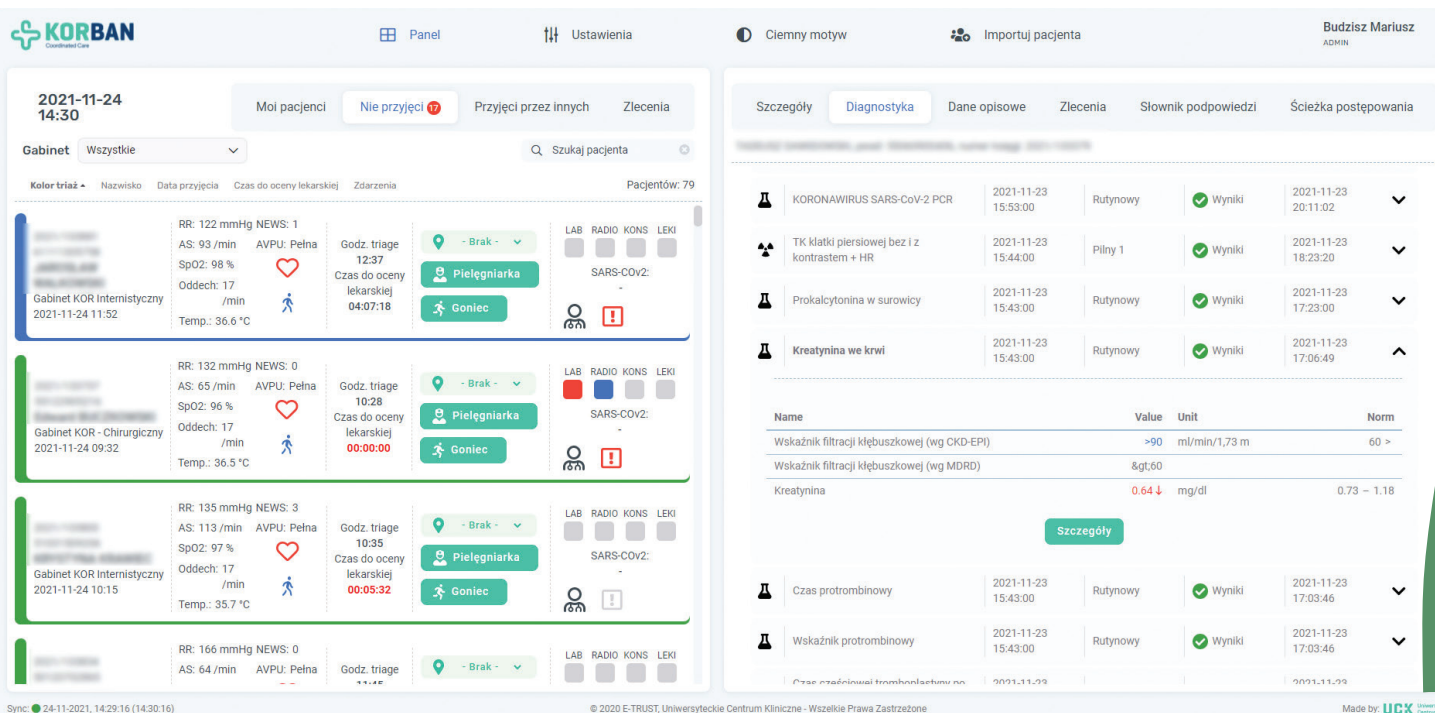
Project title: A system supporting the organization of personnel work and monitoring the parameters of the quality of work of the Hospital Emergency Department

Competition: e-Pionier II

Project value: 457 400.00 PLN

Value of financing: 457 400.00 PLN

The screenshot displays the KORBAN medical system interface. The top navigation bar includes 'Panel', 'Ustawienia', 'Ciemny motyw', and 'Importuj pacjenta'. The main content area is divided into two sections. The left section, titled 'Moi pacjenci', shows a list of patients with their names, dates of admission, and vital signs. The right section, titled 'Szczegóły', provides detailed information for a selected patient, including their name, date of birth, and medical history. The patient's current status is 'KOR - Chirurgiczny' and 'Negatywny'. The 'Triage' section shows the patient's vital signs: RR 112 mmHg, AS 61/min, SpO2 96%, Oddech 15/min, Temp 36.6 °C, NEWS 0, and AVPU Pełna. The 'Powód zgłoszenia' (Reason for admission) is 'pacjent skierowany z POZ z podejrzeniem ropnia płuca i śródpiersia, przytomny, logiczny, k-o wydolny - objawy od około 3 tygodni.' The 'Timer' section shows the time remaining for the patient's stay.



WHAT PROBLEM DOES IT SOLVE?

The system solves several basic problems:

- quick identification of the order of admitted patients
- shows up to date the maximum time of patient admission by a doctor due to the current qualification of the patient
- allows you to define automatic notifications for specific events in the system - from large amounts of data
- selects from the central system and presents those critical for the patient's treatment process in the ER
- indicates the pathways of management in standard types of diseases, e.g. renal colic
- increases the quality and repeatability of medical services provided

The system has interfaces alerting to the need to take specific supportive actions, e.g. asking for water or other help, when the patient waits for more than 2 hours. It has a module for medical assistants who can inform the patient about the ongoing activities, eg waiting for the result, creating documentation, etc. This allows to significantly reduce the stress caused by the stay in the ER.

WHO BENEFITS FROM THE PROJECT?

The system can be used by Hospitals with ER Departments, for which issues related to the quality of services provided, reducing the level of stress in patients are important issues. Units that care about the repeatability of medical processes. Currently, the system is implemented at the University Clinical Center in Gdańsk, which runs one of the larger ER Departments every day and places great emphasis on the comfort of patients - the slogan „Patient in the center of attention” is not an empty slogan there.

OPERATIONAL PROGRAM KNOWLEDGE EDUCATION DEVELOPMENT (OP KED)

The Operational Program Knowledge, Education and Development (OP KED) aims to improve the policy and public activities for the labor market, education and the entire economy. EU subsidies allow for the strengthening of higher education in such aspects as the need for development, promotion of social innovation. The OP KED is implemented by NCBR, which acts as an Intermediate Body for Priority Axis III - Higher education for the economy and development.

The recipients of the activities are universities and entities participating in higher education, students, doctoral students, university staff, as well as other persons participating in higher education. The main beneficiaries are universities and other entities providing education at the higher level, the minister responsible for higher education and the National Agency for Academic Exchange.

Breaking communication barriers by teaching sign language.

Beneficiary:

Jan Długosz University of Humanities and Natural Sciences in Częstochowa

Project title:

Massive, open course of Polish sign language at the basic level

Competition:

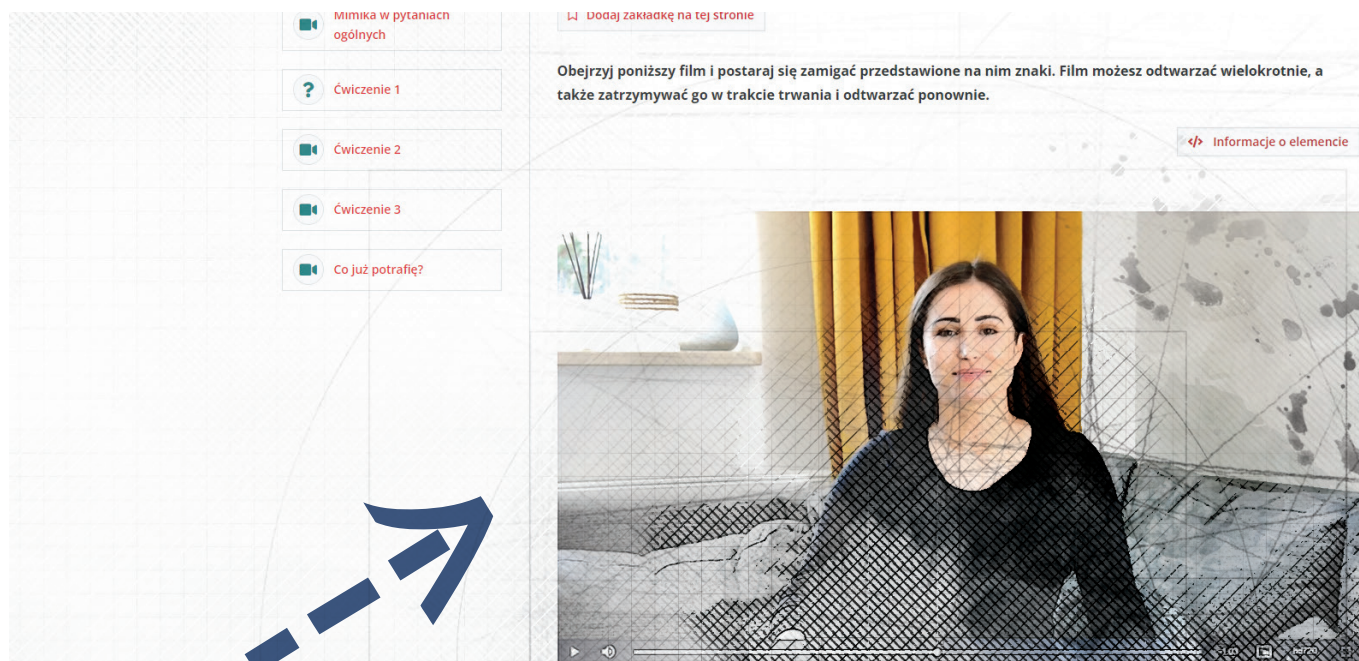
Kurs na MOOC

Project value:

171 740.00 PLN

Value of financing:

166 587.79 PLN



WHAT PROBLEM DOES IT SOLVE?

The project increases the educational offer in the field of Polish sign language by creating and implementing a MOOC (Massive Open Online Courses). Thanks to the implementation of the project, it was possible to popularize knowledge about sign language and to acquire the basic skills during the course. Completing the course gives you the opportunity to use PSL in simple communication situations, such as making contact or talking about yourself and your immediate surroundings. It allows you to get acquainted with the visual-spatial nature of sign communication and allows you to understand the rules of communication in PSL. The course is available free of charge on the navoica.pl platform for all those interested in learning sign language. The remote form of education eliminates time or territorial restrictions, which means that you can participate in the course from anywhere via a computer or a mobile device with Internet access, and self-regulate the amount of time devoted to learning during the course.

WHO BENEFITS FROM THE PROJECT?

The project is intended for people who:

- want to learn to communicate in natural sign language
- have contact with deaf people in their workplace (including employees of administration, health care units, police units, fire brigades, municipal guards, social services, the education system, employees of institutions related to tourism and recreation)
- want to gain additional competences
- are family members of a deaf person or there is a deaf person in their social environment
- the course may be attended by deaf or hard of hearing people who have not used the Polish sign language before.



New technologies in the hands of seniors

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|----------------------------|--|
| Beneficiary: | West Pomeranian University of Technology in Szczecin |
| Project title: | Third Age Technologically |
| Competition: | University's Third Mission |
| Project value: | 1 671 480.00 PLN |
| Value of financing: | 1 619 080.00 PLN |

WHAT PROBLEM DOES IT SOLVE?

Seniors are often active people, wanting to expand their competences and knowledge of the rapidly changing world. The problem is that it is very difficult for them to find a suitable offer. Thanks to this project, older people not only "follow" the changing world, but also actively participate in it. For years, the university has been implementing various educational and promotional projects aimed not only at students. One of them was the Children's University, run since 2009. It turned out that the youngest are very often brought to classes by... grandparents. The question arose: why not prepare classes just for them, for seniors? It was quickly discovered that the stereotypes related to the image of the elderly are false - these are not people sitting on the couch watching TV, but people curious about the world and eager for knowledge, sincerely interested in participating in classes conducted by our specialists. Seniors are involved in a project aimed at promoting and disseminating technical and natural sciences, scientific achievements and research and their use in social life. Employees of the West Pomeranian University of Technology (ZUT), undertaking cooperation with the Universities of the Third Age operating in the region, have prepared a varied and very interesting offer of didactic and cultural activities. Each participant can choose 6 out of 12 thematic modules (from chemistry, through

biotechnology, to economics and computer science) carried out in groups by 10 academic departments. Classes concern the application of new technologies in everyday life, presentation of the achievements of exact sciences and such fields as electronics, information technology and mechanics. Project participants have a unique opportunity to get acquainted with the well-equipped laboratories, which are available every day only to students and lecturers of ZUT. The program activates the elderly and has a practical impact on the development of their competences in the modern, ever-changing world.

WHO BENEFITS FROM THE PROJECT?

Ultimately, over a period of 36 months (2019-2021), over 1000 seniors aged sixty and more will participate in the project. The West Pomeranian University of Technology in Szczecin helps this group of people lead an active life, in accordance with the current truth that man can - and today also must - learn perpetually. The biggest challenge during the implementation of the project was the appropriate adjustment of the form of classes to the target group of seniors. The teachers used an appropriate way of conveying even very complex issues that are actually used in everyday life, although we often do not even realize it.

Simply a „Young da Vinci”!

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|----------------------------|--|
| Beneficiary: | Wyższa Szkoła Humanitas |
| Project title: | Young da Vinci - innovative activities for children and youth in Orzesze |
| Competition: | Young Explorer University |
| Project value: | 498 832.14 PLN |
| Value of financing: | 481 927.42 PLN |

WHAT PROBLEM DOES IT SOLVE?

The project uses the methods of project work, which strongly activates kids. The workshops focused on areas such as molecular gastronomy, chemical and biological experiments and programming, i.e. classes with robots. The students became „young researchers” - they had the opportunity to practice, research, test and apply the acquired knowledge in practice, to experiment. There were also controlled explosions in chemistry classes and autopsies of frogs. This allowed the participants to develop such skills as independence, responsibility and decision-making. Children planned their tasks, carried them out on their own and looked for solutions to emerging difficulties. Implementation of the activities based on the experimental method developed social skills through group work, awakened creativity and curiosity, which is an inborn trait of children, which determines the successful course of the didactic process. The classes were designed to engage the participants enough to arouse their interest in the scientific world. Additionally, the Beneficiary organized a conference opening the project, which took place at the Humanitas College in Sosnowiec. Young „scientists” could then enter the university for the first time. Apparently, that day there was an atmosphere of excitement, which was accompanied by great interest on the part of the students. They could see that these were not impregnable walls.

WHO BENEFITS FROM THE PROJECT?

The implementation of the project was a large undertaking and despite the limitations during the pandemic, it was a huge success. More people than initially assumed took part in the project - 164 children from the area of Orzesze were covered by the project, which is 102.5% of the assumed goal.

While participating in the project, the students experienced a sense of agency. They understood that something depended on them. It is important because young people have the need to create their surroundings, they want to act. For this purpose, it is necessary to release their potential and accompany them, so that later - e.g. while studying - they engage in the activities of student groups, act locally - for the benefit of the district, neighbors and implement other large initiatives or international projects. After all, the school should also be a place where kids can develop their passions. Unfortunately, there are not many activities, such as those initiated in the project, in schools. That is why a large proportion of young people stop asking questions and wondering about the world. They do not see solutions even to persistent problems and begins to wait passively for help from adult caregivers.



PROGRAMS IMPLEMENTED FOR NATIONAL SECURITY AND DEFENSE

The National Center for Research and Development, in consultation with the Minister of National Defense and the Minister of Interior, conducts activities related to research for security and defense. In competitions for specific research topics, projects are funded that promise the greatest real increase in national

security. The aim of the programs and projects being implemented is not only to increase the potential of Polish scientific and industrial entities, but also to strive for technological independence by creating Polish „know-how” in the field of critical technologies related to state security and defense.

Detection and tracking of flying objects, i.e. SkanDRON.

Beneficiary:

Jarosław Dąbrowski Military University of Technology – Optoelectronics Institute (Leader), Air Force Institute of Technology (Consortium member), Kenbit Koenig i Wspólnicy Sp. J (Consortium member), Nordcom Sp. z o.o. (Consortium member)

Project title:

Low-flying object detection and tracking laser system - SkanDRON

Competition:

Competition 9/2018

Project value:

9 154 198.00 PLN

Value of financing:

8 914 198.00 PLN

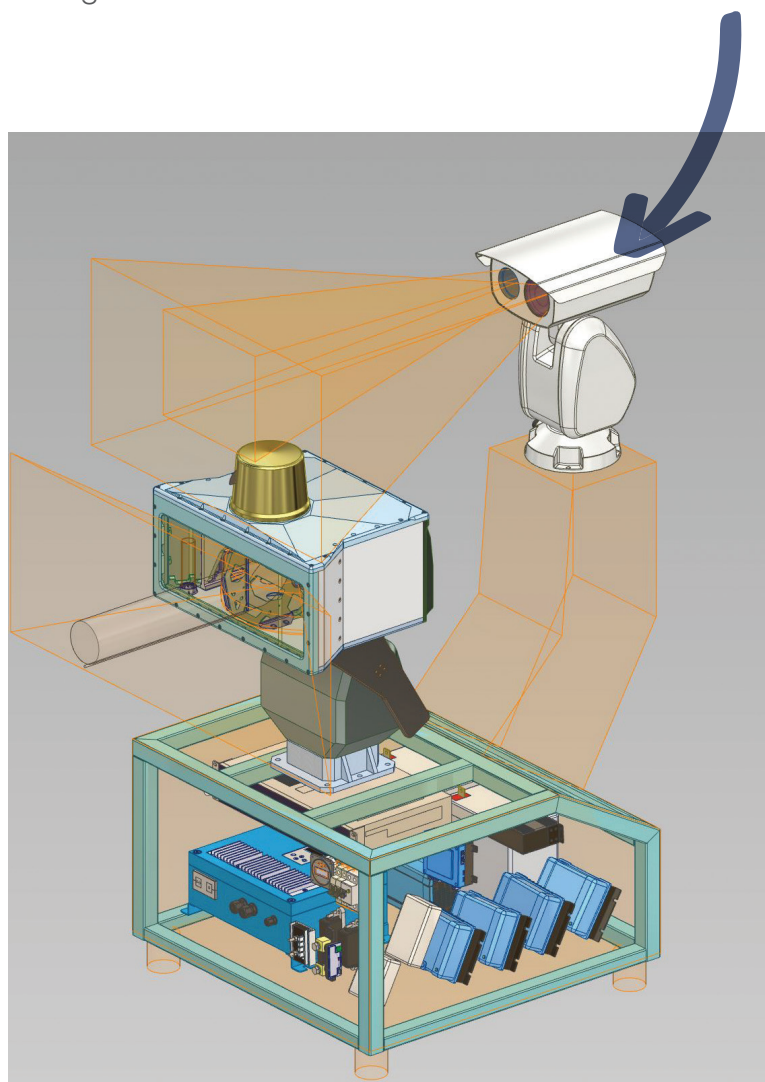
WHAT PROBLEM DOES IT SOLVE?

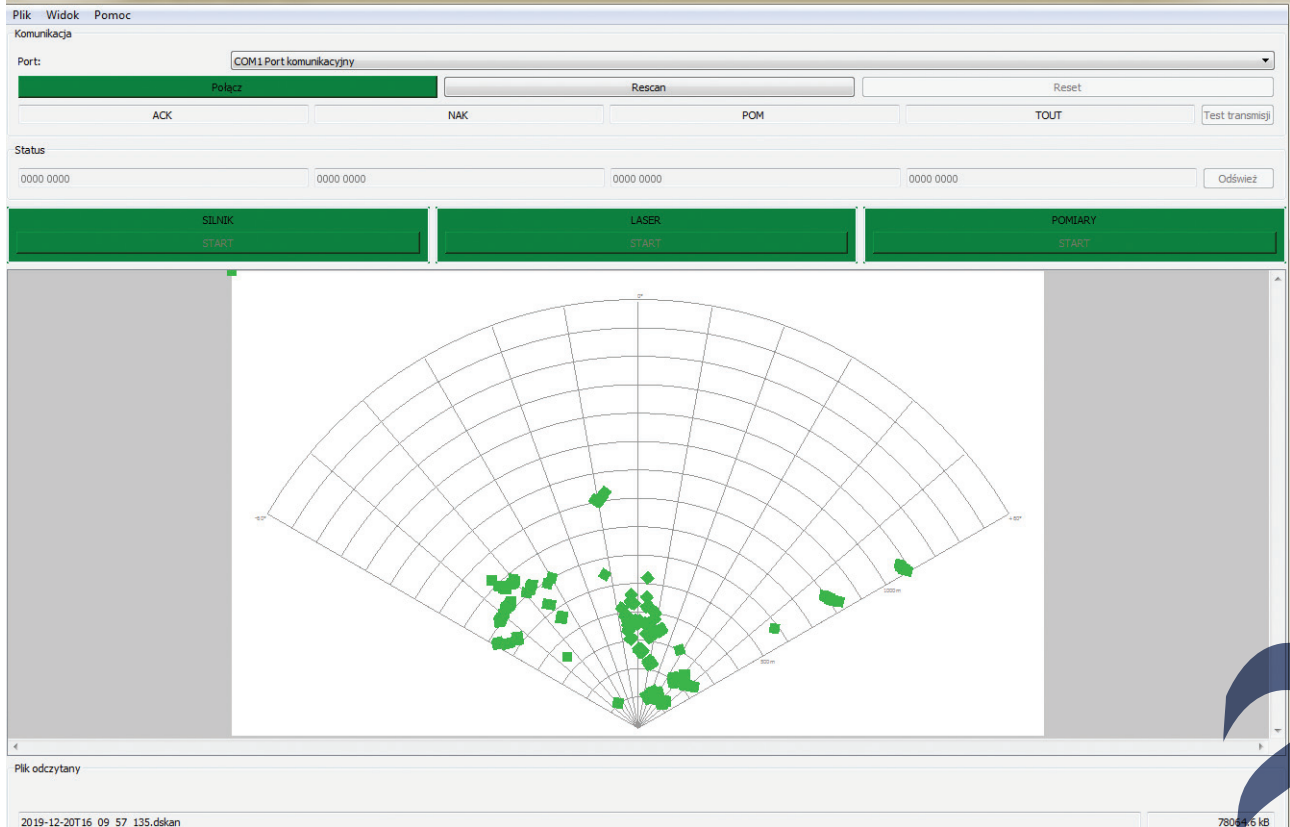
The system makes it possible to detect and track even small objects, not smaller than 18 cm x 32 cm. They are characterized by a reflectance (it is a parameter that determines the reflection of the laser beam) at the level of over 20%. The scanner developed at the Institute of Optoelectronics of the Military University of Technology effectively detects such drones from a distance of 850 m. Objects larger or with a higher than the given radiation reflectance is detected at much greater distances. For example, an airplane will be detected from around a few kilometers. The parameters shown are critical values. This means that from a distance of 850 m, the scanner detects objects moving at the highest technological speed. If, on the other hand, the aircraft is flying slowly, the system will detect it much earlier. The key component of the system developed as part of the project is a laser scanner developed from scratch. It enables continuous monitoring of the observed sector at an angle of 120 ° and in real time and determination of the location of detected objects. Initial classification of the objects detected this way is

performed by the system on the basis of the depolarization signatures of the reflected radiation. The precise data on the position of the detected object determined by the laser scanner is transferred by the software to the optoelectronic head control module (dual vision and thermal imaging camera). This module sets the correct direction of the camera's observation and the optimal magnification parameters thanks to the electronically adjustable zoom. This allows for a visual mapping of the suspicious object and enables the system operator to verify it.

WHO BENEFITS FROM THE PROJECT?

The functionality of this system will be available to services and formations performing tasks in the field of critical infrastructure protection, security of mass events, protection of facilities and property, and counteracting illegal use of UAVs (Unmanned Aerial Vehicles - commonly called drones). The system will make it possible to counteract the use of unmanned objects in border crime. It will be used to limit unauthorized crossing of the state border as well as uncontrolled flights near the state border.





INTERNATIONAL PROGRAMS

International cooperation, implemented thanks to various types of international projects, results directly from the provisions of the NCBR Act and is one of the tasks performed by the Center. As part of the cooperation, NCBR undertakes various types of competition initiatives together with foreign partners from all over the world. By type, we can divide them into ERA-NET initiatives

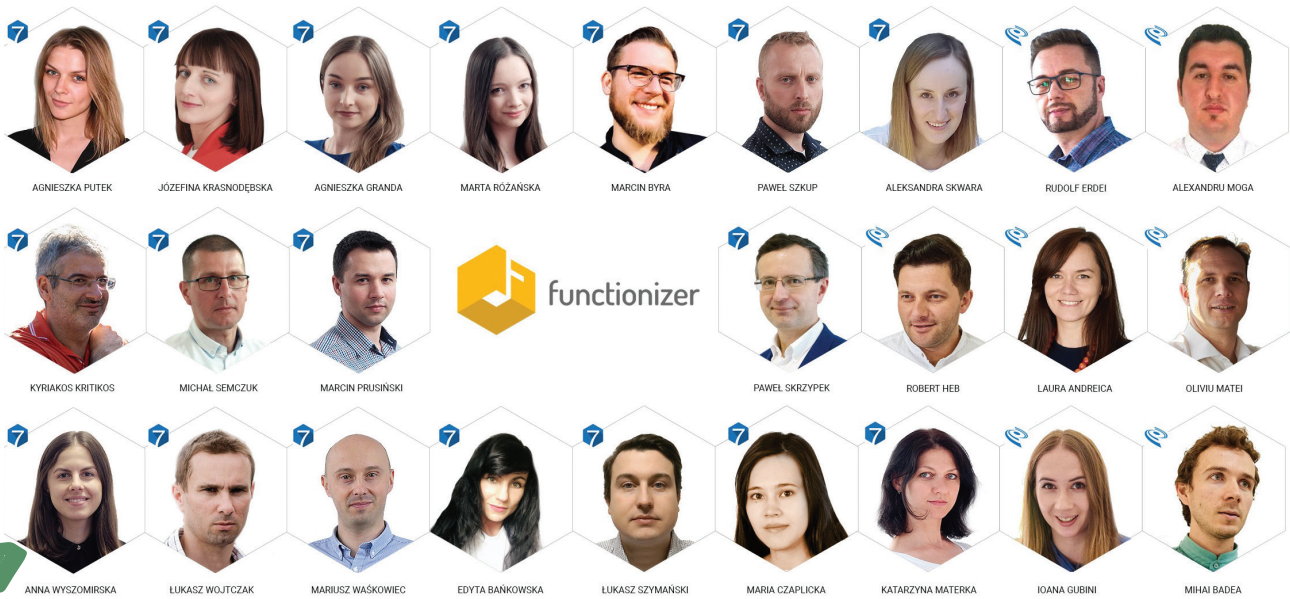
(partnerships under the EU framework programs), other multilateral initiatives, bilateral cooperation and programs financed from the Norwegian and EEA Grants. The implementation element required in some programs is of particular value, aimed at practical implementation of the results of successfully completed projects.

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| Beneficiary: | 7bulls.com Sp. z o. o. (Leader), Holisun SRL (Consortium member) |
| Project title: | Support for serverless applications in a multi-cloud environment |
| Competition: | Competition No. 8 Eurostars 2 |
| Project value: | 2 655 926.93 PLN |
| Value of financing: | 1 593 556.15 PLN |

WHAT PROBLEM DOES IT SOLVE?

The subject of the Functionizer project was to create a programming platform supporting the migration, optimization and management of software in the Serverless Computing model in a multi-cloud environment, i.e. with flexible use of resources from various vendors. Serverless Computing is a new model that represents the next stage in the development of cloud technologies. In this model, code written by developers is run using the amount of resources

currently needed to support it. This is possible thanks to the introduction of another abstraction layer that separates the software layer from the server infrastructure. The software is divided into many functions automatically triggered by the occurrence of an appropriately defined event. The application uses the infrastructure resources of an external provider, and the fee is charged only for the time of using these resources, thanks to which it is possible to significantly reduce costs in relation to owning and managing your



own servers. The demand for such a solution as Functionizer results from the growing number of applications, the operation of which is based on the processing of large volumes of data and requires maximum efficiency with optimal use of resources.

The 7bulls team implemented the project in cooperation with the company Holisun SRL from Romania. The role of the partner was primarily to provide a reference application, necessary for the correct definition of technical and functional requirements of the solution and its validation in real conditions. This assumption was implemented on the basis of an application processing the video data stream for facial recognition. According to the assumptions, the goals of the project were achieved by developing the CAMEL (Cloud Application Modeling and Execution Language) domain language extensions enabling modeling applications composed of serverless components in this language, i.e. functions. Additionally, synergy was used with the MELODIC platform developed with the participation of 7bulls, supporting the creation and development of applications in the multi-cloud model.

WHO BENEFITS FROM THE PROJECT?

The offer is addressed to organizations of any activity profile, using or planning to use cloud solutions and services (Cloud Computing). Potential recipients of the solution are programmers / developers using the Functionizer platform available in the open source model (end users) and private and public organizations interested in migrating to the cloud (customers interested in purchasing consulting services provided by 7bulls). The most important group of customers will be organizations with experience in using cloud services, including organizations that already have at least one cloud application and are interested in optimizing its operation and improving cost efficiency.

Beneficiary:

Military Institute of Engineering Technology, Wrocław (WITI), Chung-Ang University, South Korea (leader), Polymer Institute, Slovak Republic, J. Heyrovsky Institute of Physical Chemistry, Czech Republic, Wigner Research Center for Physics, Hungary

Project title:

Lead-free perovskite solar cells with long-term durability

Competition:

V4-Korea Joint Research Program

Project value:

550 738.99 PLN

Value of financing:

550 738.99 PLN

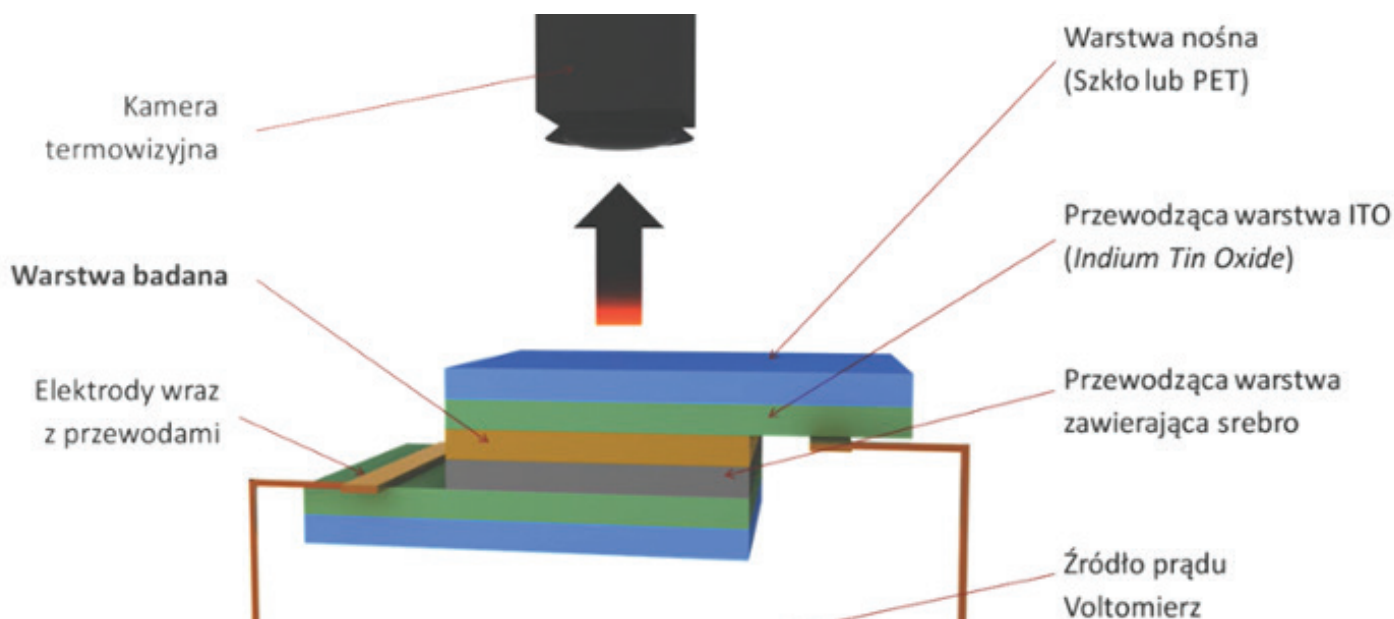
WHAT PROBLEM DOES IT SOLVE?

The aim of the project carried out by WITI was to obtain cheap and stable in the air atmosphere and thermally new organic compounds for use as a hole transporting layer (HTM) in perovskite solar cells. As organic compounds, symmetrical and asymmetrical imines have been proposed, which were obtained in a one-stage process of condensation of an aldehyde with amines / diamines, where the by-product of the reaction is only water. The proposed method of imine synthesis can be described as environmentally friendly, also due to the fact that inorganic catalysts are not used. An additional advantage of the proposed solution is the reduction of the costs of producing the HTM layer, currently based mainly on the commercial compound Spiro-OMeTAD (about 494 Euro / gram), the cost of which is

about 7.6 times higher than the imines proposed for the project (65 Euro / g). In addition, in order to minimize the cost of producing solar cells, a thermal imaging camera for the produced layers was proposed and successfully applied to analyze surface defects and electrical and thermal parameters, which are crucial in the construction of efficient perovskite solar cells. The advantages of the proposed imine-based solution in relation to Spiro-OMeTAD are price, efficiency (PCE), durability and environmental friendliness.

WHO WILL BENEFIT FROM THE PROJECT?

Photovoltaic industry, especially perovskite solar cell area. Energy sector. Individual and collective recipient. Building integrated photovoltaics (BIPV).



NATIONAL PROGRAMS

One of the main goals of the Center, resulting directly from the Act on NCBR, is to support the creation of modern solutions and technologies that increase innovation, and thus the competitiveness of the Polish economy. The activities of the Center are to strengthen cooperation between Polish entrepreneurs and contribute to the commercialization of the results of scientific research for the benefit of the Polish economy. NCBR implements these goals by developing programs to support applied research and R&D

works, financing commercialization and transfer of results to the economy, as well as supporting the development of young scientific staff. The response to the market needs was the announcement and holding of competitions targeted at specific industries and sectors of the national economy. These competitions were aimed at stimulating the emergence of innovative and modern solutions in Polish enterprises, and thus - creating a competitive advantage of the Polish economy in the world.

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|----------------------------|---|
| Beneficiary: | Institute of Nuclear Chemistry and Technology, „Biopolinex” Sp. z o.o. |
| Project title: | Plasma technology for the removal of nitrogen oxides from exhaust gases |
| Competition: | TANGO |
| Project value: | 1 295 522.47 PLN |
| Value of financing: | 1 118 153.89 PLN |



WHAT PROBLEM DOES IT SOLVE?

Heavy fuel oils containing up to 3.5% sulfur by weight are the basic marine fuel, and the sulfur and nitrogen oxides are emitted as a result of combustion of these fuels in diesel engines, with the concentration of nitrogen oxides in the exhaust gas reaching 1700 ppmv, and the concentration of sulfur dioxide (SO₂) up to 700 ppmv. These emissions, combined with the intensity of sea transport, translate into global air pollution. In order to control the emissions of nitrogen oxides and inorganic pollutants present in the exhaust gas, it is necessary to use two separate emission control systems connected in series. The Institute has developed a technology that allows for the simultaneous control of the emission of all harmful gaseous pollutants, which could potentially solve the problem of gaseous pollutants emitted from marine diesel engines, and can also be used in the case of stationary emitters (power generators, biogas plants, etc.).

WHO BENEFITS FROM THE PROJECT?

At the Riga shipyard (Latvia), the world's first practical demonstration took place of the possibility of cleaning exhaust gases from marine diesel engines using an innovative hybrid technology combining exhaust gas irradiation with an electron beam from an accelerator with the absorption of pollutants in an aqueous solution, developed under the TANGO2 project. Implementation works were financed under the H2020 ARIES project (Accelerator Research and Innovation for European Science and Society) and were carried out in international cooperation between institutions from three countries: Poland (Institute of Nuclear Chemistry and Technology and Biopolinex), Germany (Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP) and Latvia (Riga Technical University), in conjunction with CERN, coordinating the European project. The offer is addressed to shipyards and owners of ships equipped with diesel engines, as well as to users of stationary devices that are emitters of exhaust gases and gases that require cleaning (power generators, heating plants, biogas plants, etc.).



Beneficiary:

The Faculty of Mechanical Engineering of the Wrocław University of Technology, the J. Gromkowski Provincial Specialist Hospital in Wrocław

Project title:

The method of immediate additive manufacturing of spare parts and alternative medical equipment and personal protective equipment in a dispersed environment in crisis situations - Virtual AM Storage Covid-19

Competition:

Supporting homonymous hospitals in the fight against the spread of SARS-CoV-2 infection and in the treatment of COVID-19

Project value:

2 172 500.00 PLN

Value of financing:

2 079 350.00 PLN

WHAT PROBLEM DOES IT SOLVE?

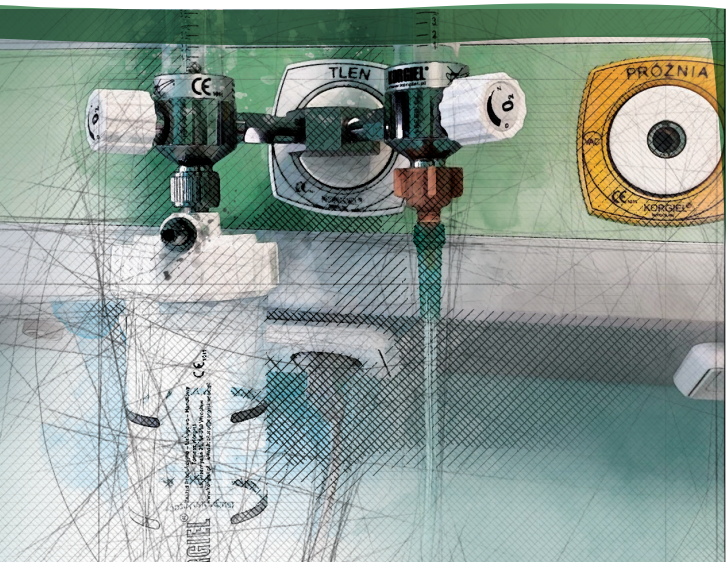
The use of additive technologies in various industries enables the creation of digital warehouses (virtual storage), where it is possible to store data on finished products intended for production, and in the event of a demand for an element, its digital model along with information on production and its use is transferred directly to the contractor. Due to the lack of explicit criteria and requirements relating to the quality of additive manufactured products, guidelines were developed and implemented within the international pilot digital platform. The platform is used to analyze digital models and identify spare parts for medical equipment and manage distributed production. The solution enables immediate replenishment (up to 12 hours) of spare parts for medical equipment and personal protective equipment in crisis situations, as a result of an interruption or overload of the current supply chain.

The use of the digital platform allows for:

- quick ordering by hospitals and healthcare entities of the necessary spare parts or alternative medical equipment and PPE
- verification of ideas in terms of technology by a team of experts on additive technologies, for new solutions (spare or alternative parts) proposed by both medical workers, paramedics and manufacturers (entrepreneurs, 3D printing enthusiasts)
- expansion of the network of suppliers / contractors of spare parts, which in critical situations allows for quick resupply of spare parts, even in cases of large orders

WHO BENEFITS FROM THE PROJECT?

The results of the project can be used both by hospitals and companies involved in the production, research institutions and other entities operating in the 3D printing industry. The digital platform developed as part of the project allows you to quickly start producing the spare parts needed. For hospitals and medical facilities, the platform is a kind of online store where hospitals quickly identify their needs and fulfill orders - especially when normal supply chains are interrupted or overloaded.





STRATEGIC PROGRAMS

Strategic research and development programs are high-budget programs resulting from the state's scientific and innovation policy, serving the social and economic development of Poland. The basis for their reparation is the National Research Program, established by a resolution of the Council of Ministers of 16 August 2011, which defines strategic directions for conducting research and development works. Based on the directions indicated in the document, the NCBR Council prepares draft strategic programs and then presents them for approval to the minister responsible for science.

The strategic program consists of projects to solve specific technical, scientific or social problems. Competitions for the implementation of projects are top-down, which means that applicants should fully take into account the requirements specified in the call for proposals. The implementation of strategic programs contributes to the consolidation of the best research teams and the integration of scientific and economic circles around issues of key importance for the country's development.

Beneficiary:

Military Medical Institute (Consortium leader), Consortium members: Military University of Technology, Medical University of the Silesian Piasts in Wrocław, Medical University of Gdańsk, 4th Military Clinical Hospital with Polyclinic SP ZOZ, Infoscian S.A. (until 2019), Łukasiewicz Research Network - Institute of Medical Technology and Equipment (from 2020), CasusBTL Group Sp. z o.o. (from 2020)

Project title:

A new model of medical care with the use of modern methods of non-invasive clinical evaluation and telemedicine in patients with heart failure (AMULET)

Competition:

STRATEGMED

Project value:

12 582 626.92 PLN

Value of financing:

12 289 980.92 PLN



WHAT PROBLEM DOES IT SOLVE?

The project developed and evaluated the effectiveness of a new model of outpatient telecare for patients with heart failure, containing an element of home telemonitoring. The developed solution will enable individualized patient monitoring, coordination of the treatment process and teleconsultation. A comprehensive model of telecare, unique on a global scale, has been developed. It enables optimal management of personnel resources, improves access to specialist supervision and ensures higher quality of care. The clinical trial proved the effectiveness in the most important clinical aspect - improvement of prognosis by reducing the number of hospitalizations due to exacerbation of the illness by 38%. The possibility of home care with monitoring of haemodynamic parameters and clinical symptoms increases the chances of an early identification of deterioration in the patient's condition and immediate therapeutic intervention. The solution may bring benefits to over 1 million Poles with heart failure.

WHO BENEFITS FROM THE PROJECT?

The AMULET model is an organizational and technological innovation that improves the functioning of the health care system in the field of outpatient care for patients with heart failure by increasing access to high-quality care. This solution is in line with the latest trends - it promotes the use of telemedicine and the competence of nursing staff. The number of potential beneficiaries of the AMULET model in Poland is hundreds of thousands of patients with heart failure, and preventing unplanned hospitalizations in this group of patients will bring positive clinical, social and economic effects. Initial assessment also indicates its cost-effectiveness. The model is universal and can be implemented, for example, in primary health care and other medical specialties.



Competitions announced
in 2021

European Funds, Smart Growth Operational Program

Competition name

Competition allocation in PLN million

1/1.1.1/2021 Fast track

2 417

European Funds Operational Program Knowledge Education Development

Competition name

Competition allocation in PLN million

Teaching Staff for Universal Design

20

Accessible University III

113.5

Strategic program



Competition name

Competition allocation in PLN million

GOSPOSTRATEG V (ordered projects)

25

GOSPOSTRATEG VI (open call)

80

GOSPOSTRATEG VII (ordered projects)

20

INFOSTRATEG II (themed projects)

60

INFOSTRATEG III (ordered projects)

18.4

NEW TECHNOLOGIES IN THE FIELD OF ENERGY

377.7



National program

| Competition name | Competition allocation in PLN million |
|----------------------------------|---------------------------------------|
| BRIK II | 50 |
| ARTIQ – AI Centers of Excellence | 60 |

Defense and security

| Competition name | Competition allocation in PLN million |
|--|---------------------------------------|
| Development of modern, breakthrough technologies for the security and defense of the state under the code name "SAPPHIRE" - competition no. 3 | 750 |
| Development projects, competition no. 11/2020 - 2nd round | 100 |

International program

| Competition name | Competition allocation in PLN million |
|---|---------------------------------------|
| ERA-NET CORE Organic Cofund Third Call JC2021 | 2,6 |
| EuroHPC JU (Call 2020-03) | 2,3 |
| QuantERA II, (1st competition) Call 2021 | 4,6 |
| ERA-NET CO-FUND ICRAD/2 competition | 3,4 |
| M-ERA.NET 3 Call 2021 | 27,5 |
| ERA HDHL Call 2021 | 1,8 |
| ERA-Net MarTERA (Call 4/2020) | 4,5 |
| 2021 Joint Call on Circularity | 5,5 |
| EJP Soil Management | 2,7 |

| | |
|--|-----|
| Neuron Cofund 2, (1st competition JTC 2021) | 2,6 |
| EJP RD, 4th competition JTC 2022 | 2,8 |
| ERA PerMed, 5th competition JTC 2022 | 2,8 |
| ERA-MIN 3 Cofund Call 2021 | 5,4 |
| TRANSCAN3 Cofund JTC2021 | 5,5 |
| POLLUX (11th competition CORE 2022) | 2 |
| Poland-Turkey cooperation V (POLTUR 5) | 5,1 |
| Poland-Taiwan cooperation, IX competition | 5,8 |
| Poland - Berlin / Brandenburg cooperation, 5th competition | 6,9 |
| Poland-Germany cooperation, 4th competition | 6,9 |
| CORNET (31st competition) | 3,4 |
| CORNET (32nd competition) | 3,4 |
| EUREKA call for 2021 | 4,4 |
| V4-Japan/2 competition | 3,4 |
| EIG CONCERT-Japan 8th competition | 3,4 |
| 1st competition under the INNOGLOBO Program | 10 |
| JPI Oceans – Underwater Noise | 1,4 |
| „Solidarity with scientists” competition | 6,2 |
| Key Digital Technologies Partnership (competition in 2021 - KDT Call 2021) | 6,9 |
| Innovative SMEs 1st competition | 6,8 |

In 2021, we also conducted 13 other competitions, which were announced in 2020, and the recruitment for the competitions started and ended in 2021. The total amount allocated to all competitions in 2021 was PLN 4.4 billion.



*„Landscape of innovation“
– NCBR publishing cycle*

In 2021, the Center published three new publications in the series „The Landscape of Innovation”. This is a publishing cycle in which we share our professional and unique knowledge with the market, supported by our many years of experience. The publications deal with various topics

related to R&D, to a large extent they concern implementation of programs financed from European Funds. The first publication „Analysis of research trends in applications for funding submitted under the OP SG in 2016-2019” was issued in 2020 ⁶.

State aid - effects of the implementation of the Aid Program in 2014–2019

The publication is the first, preliminary summary of the results of state aid granted by the NCBR in 2014–2019. The study was prepared on the basis of the results of two evaluation studies conducted in 2017–2020.⁷ The NCBR Aid Program is a response to the identified problem, which was the low level of innovativeness of the Polish economy, including research and development activity of enterprises. The publication presents two forms of support for entrepreneurs: the first - the largest in terms of amount and number of programs - is subsidies for research and development projects, the second is support for R&D through venture capital funds.



International R&D projects at NCBR - application, implementation, success

In the publication, we refer to the issue of international cooperation and activities. This publication summarizes the NCBR's activity in the field of cooperation beyond the borders of Poland. It is also an attempt to familiarize potential applicants with the specifics of participation in such projects.



⁶ All publications can be downloaded at <https://www.gov.pl/web/ncbr/analizy>.

⁷ The research on subsidy instruments was conducted by the consortium of the Idea Rozwoju Foundation, IMAPP, PAG Uniconsult and the Center for Evaluation and Analysis of Public Policies of the Jagiellonian University, while the research on financial instruments was carried out by the consortium of Taylor Economics and Ecorys Polska. Due to the different nature of the instruments examined in the publication, the results were presented taking into account this division.

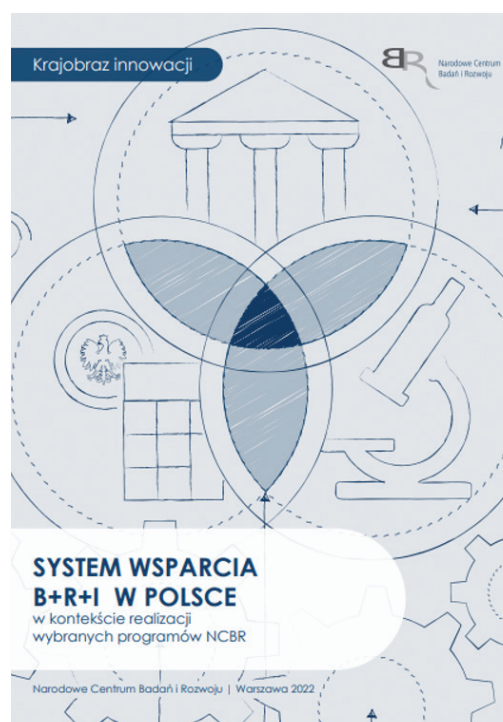
Closer to the market, closer to modern solutions. Pre-commercial Procurement and Innovative Partnership in the NCBR practice

The publication summarizes the beginnings of pre-commercial procurement and innovation partnership in the NCBR practice. The Center successfully introduced these formulas to its offer. Thanks to the use of such solutions, NCBR can more easily achieve specific results in implemented projects, and thus find solutions to significant problems. The publication is a collection of NCBR's experience in pre-commercial procurement and innovation partnership. It is also the basis for the improvement of subsequent proposals of the Centre's programs and activities in this area. We hope that the publication will be a starting point for a broad discussion on the matter described and will encourage stakeholders to organize contracts in a similar formula.



The R&D&I support system in Poland in the context of the implementation of selected NCBR programs

The publication summarizes the results of the study, in which the effects of the intervention of the National Center for Research and Development - nine programs launched by NCBR in 2012-2013 - are presented in the context of the support system and the R&D&I process, including financing from European Funds. In the publication, we present a broad study which showed that in the structure based on the breakdown of support for financing phases between different institutions, the use of public funds by beneficiaries under the same R&D&I project is sporadic. Barriers related to the transition between applied research and the financing of implementation / commercialization will be partially removed in the new financial perspective 2021-2027, financed from the European Funds, through the possibility of financing all stages of the project in one institution. Work on the publication continued at the end of 2021, and the publication was released online in March 2022.





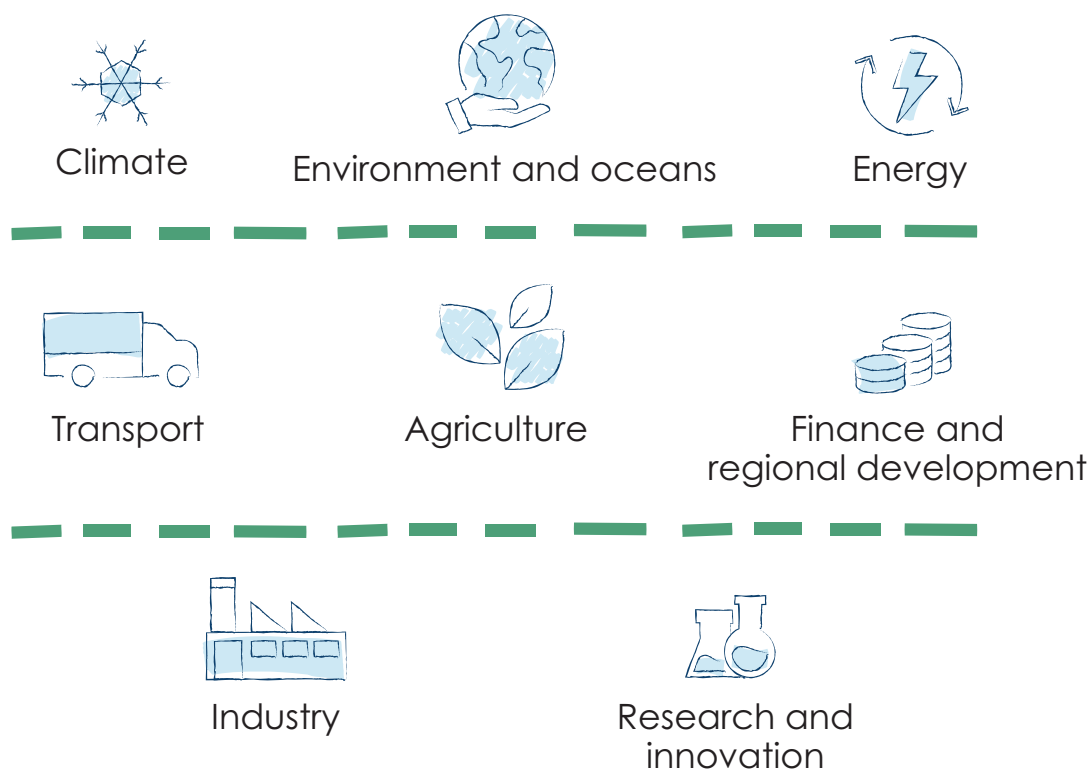
„Green NCBR“

The Center actively participates in activities aimed at counteracting climate change and environmental degradation. Our competition offer is in line with the assumptions of the European Union for 2021-2027, aimed at transforming the Union into a modern, resource-efficient and competitive global economy.

The European Green Deal is also intended to help overcome the COVID-19 pandemic, and a significant part of the EU budget (EUR 1.8 trillion) will be allocated to investments under the NextGenerationEU reconstruction plan and funds from the EU budget over a seven-year perspective.



The activities of the European Green Deal focus on eight main areas ⁸.



The benefits that will be felt by present and future generations as a result of implementing the European Green Deal.⁹



fresh air, clean water, healthy soils and biodiversity



renovated energy-efficient buildings



healthy and affordable food



greater public transport offer



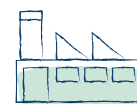
cleaner energy and the latest ecological technological innovations



more durable products that can be repaired, recycled and reused



future-proof jobs and transformation skills



resilient and globally competitive industry

„Minesweeper of Innovation” or NCBR's answer to the implementation of the European Green Deal.

NCBR has offered the market new formulas of R&D support in the modes of pre-commercial procurement (PCP) and Innovative Partnership (PI). These are non-statutory solutions enabling the implementation of R&D works in order to solve a socio-economic problem that cannot be solved using available methods. New R&D formulas in the PCP and PI modes have not been used on a large scale in Poland before. They are also relatively rare in other European Union countries. Currently, there is a development policy trend in the EU, i.e. the application of selected development missions defined with the participation of citizens, aimed at solving a specific socio-economic problem. New formulas of R&D support have been used in the NCBR practice since 2016. The first financing instrument organized in such a formula was e-Pionier, financed from European Funds under the Operational Program Digital Poland. The Center also implemented other projects within PCP. These included Blocks 200+, Hydrogen Storage, Emission-Free Public Transport and e-Van.¹⁰

„Minesweeper of Innovation” is a strategy for transforming the economy and stimulating the market developed by NCBR through dragged innovations (i.e. those that arise in response to a specific social, economic or environmental need). The „Minesweeper of Innovation” is based on two pillars:

- implementation of research projects in the form of Pre-commercial Procurement
- wide dissemination of the results obtained under the projects, also in cooperation with external institutions.

The „Minesweeper of Innovation” strategy creates a specific framework for launched projects, making it scalable, transparent for contractors, and can also be used for any project portfolio within an undertaking that aims to bring about a significant change in the market (or even its creation). Scope proposals for new ventures can be collected both from the government level and from specific stakeholders.

In November 2021, „Minesweeper of Innovation” was recognized by the European Innovation Council, and NCBR received an award in the first edition of the European Innovation Procurement Awards (EUIPA). Initiatives under the „Minesweeper of Innovation” are financed from European Funds under the OP SG.

⁹ Source: European Commission.

¹⁰ Source: „Closer to the market, closer to modern solutions. Pre-commercial Procurement and Innovative Partnership in the practice of NCBR, National Center for Research and Development, Warsaw 2021, <https://www.gov.pl/web/ncbr/blizej-rynku-blizej-nowoczesnych-rozwiazan-zamowienia-przedkomercyjne-i-partnerstwo-innowacyjne-w-praktyce-ncbr>.

INCBR initiatives under „Minesweeper of Innovation” „Wastewater Treatment of the Future”

Project budget:

25m PLN

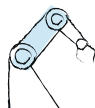
The „Wastewater Treatment of the Future” project is one of the NCBR activities carried out in the PCP formula. The project focuses on a new look at the municipal wastewater stream as a resource of water, energy and recyclable materials, while maintaining the basic requirements of wastewater treatment plants, such as ensuring sanitary safety and optimizing the operating

costs of treatment plants. The innovations developed as part of the project will enable the removal of micro-pollutants present in treated wastewater directed to rivers, as well as the effective management of sewage sludge. In the second quarter of 2021, contracts were signed with three Contractors who started the research work under stage I of the project.

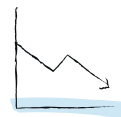
Benefits of the wastewater treatment of the future



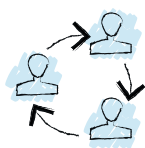
Reducing the consumption of water resources



Reduction of mineral extraction



Reducing the nuisance of the sewage treatment plant



Improving the living conditions of the society



Improving the quality and conditions of the water and soil environment



Development of a technologically innovative industry

„Innovative biogas plant”

Project budget:

28.5m PLN

The aim of the research work carried out as part of the project is to develop a universal automated biogas plant that produces biogas, which will reduce or eliminate the need to ensure continuous, specialized supervision over the course of the process. The developed technology will contain additional elements of technological innovation, increasing operational flexibility and profitability of work, at the same

time solving key problems for the industry, such as the emission of odors that are burdensome for humans, which often provoke intense protests and make it impossible to locate the installation in a favorable place. In the second quarter of 2021, two contracts were signed, and in the third quarter of 2021 one contract with R&D contractors who started the implementation of stage I of the project.

Benefits of the Innovative Biogas Plant



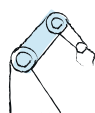
Improvement of soil quality



Reduction of greenhouse gas emissions and odors



New, numerous, permanent, local jobs in rural regions



Reducing natural gas imports and extraction of fossil fuels



Development of biogas producing technologies biomethane



Reduction of odor nuisance

„Energy and process-efficient construction”

Project budget:

37.5m PLN

The main goal of the project is to develop innovative 2D (prefabricated) and 3D (modular) technologies in the construction of a single-family and multi-family building with the best possible, optimally zero or positive annual balance of energy consumption with the use of auxiliary installations. The buildings will be made largely of secondary raw materials, with the aim of reducing CO₂ emissions as much as possible during the production of building materials. The implementation of the project will reduce the

carbon footprint during the entire life cycle of the building. The development of energy-efficient technologies, modular and prefabricated, will allow to reduce construction and operating costs as well as faster commissioning of buildings. In the second quarter of 2021, five contracts were signed, and in the third quarter of 2021 one contract with R&D contractors who started the implementation of stage I of the project under three streams: Stream 1 - Social Housing, Stream 2 - Senior Housing, Stream 3 - Single-family housing.

The benefits of modern construction



Acceleration of the process, reduction of construction and operating costs



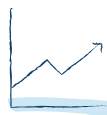
Export of finished houses with equipment to foreign markets



Creation of new jobs



Energy independence of housing



Opportunities for the development of the Mieszkanie+ program and senior housing



Increase in the availability of housing

„Electricity Storage“

Project budget:

14.45m PLN

The main goal of the project is to develop an innovative electricity storage system based on galvanic cells. The project is divided into two streams - the „Battery“ stream, which involves the development and implementation of innovative galvanic cells, and the „System“ stream, the purpose of which is to create an innovative

system of energy storage. In the second quarter of 2021, one Contractor was selected in the „Battery“ stream, and four Contractors in the „System“ stream. In the third quarter of 2021, the implementation of research and scientific works as part of stage I of the project began.

Benefits of Electricity Storage



Powered exclusively by renewable or grid-fed energy



Optimizing the use of energy in the form of heat and cold



Industrial development



Attractive cost of the system for the user

„Storage of heat and cold”

Project budget:

11.8m PLN

The main goal of the project is to develop energy-efficient systems supplying heat and cold for the home and office, using innovative technologies for storing heat and cold, by drawing the maximum energy available at a given time from renewable energy sources and distributing it depending on the building's needs. In addition, the developed systems will be characterized by high efficiency, minimal energy losses, stable heat / cold distribution, optimal cubature for the final application, and will also be harmless to the environment. The

implementation of the systems created as a result of the project will contribute to reducing the costs of heating and cooling buildings by extracting and returning energy from renewable energy in an optimal and effective way. In the second quarter of 2021, in response to the call, a total of 17 applications were submitted (10 in stream 1 „Single-family house” and 7 in stream 2 „Office building”). 9 Contractors started the implementation of stage I (5 Contractors in stream 1 „Single-family house”, 4 Contractors in stream 2 „Office building”).

The benefits of heat and cold storage



Energy-saving systems that provide heat and cold for home and office



Technologies of heat and cold storage



Use of renewable energy sources



Minimizing energy use



Environment-friendly



Clean air



Significant financial savings

„Ventilation for schools and homes”

Project budget:

8.7m PLN

The aim of the project is to develop innovative, economically effective technologies of mechanical ventilation with supply air temperature control, intended for existing residential buildings and schools. They will guarantee high air quality by reducing the level of CO₂ concentration,

microbiological pollutants, as well as the filtration of PM_{2.5} and PM₁₀ dust pollutants. In the second quarter of 2021, seven Contractors were qualified for stage I of the project (4 Contractors in Action 1 „Classroom ventilation”, 3 Contractors in Action 2 „Apartment ventilation”).

The benefits of Ventilation for schools and homes



Improving air quality
in classrooms
and apartments



Increasing
microbiological safety



Reduction in energy demand



Reduction of
operating costs



Reduction of maintenance
costs through remote
monitoring of operating
parameters



Optimization of control
processes through the use
of intelligent control

„Home Water Retention Technologies“

Project budget:

7m PLN

The main goal of the project is to develop an innovative rainwater storage and treatment system that will minimize the intake of water from the water supply and replace it with rainwater, as well as minimize the amount of

sewage discharged into the sewage system. In the second quarter of 2021, four R&D contractors were selected who started the implementation of stage I of the project.

Benefits of home water retention



Reduction of the demand for water from the water supply to a minimum level of 75% for a single-family building and a minimum of 85% for a school building



Providing adequate quality water: W1 - for consumption, W2 - for washing, laundry, cleaning, W3 - for flushing the toilet, W4 - for the garden



Retention of rainwater at the point of precipitation



Attractive cost of the system for the end-user

„The heating plant of the future, i.e. heating system from renewable energy sources“

Project budget:

36.5m PLN

The main objective of the project „Heating plant of the future, i.e. heating system from RES“ is the development and demonstration of innovative technologies and process innovations enabling the modernization of existing heating systems using renewable energy technologies in order to confirm the research hypothesis about the market feasibility of the heating system, that

will supply heat from renewable sources with a minimum share of 80% while maintaining an acceptable price for the recipient. In the second and third quarter of 2021, seven contracts were concluded for the implementation of research and development works under the first stage of the project.

Benefits of the heating plant of the future



No waste generation
(e.g. ash, slag, dust,
harmful gases)



Reduction of losses
in heat transport



Shortening of transmission lines



Stimulating the development
of national technological
thought



No charges for CO2 emissions



Supporting pro-ecological
attitudes and activities in the
use of renewable energy
and associated technologies



New jobs

„CHP plant in the local energy system”

Project budget:

41m PLN

The aim of the project is to develop an innovative solution to transform the existing national heating systems based on fossil fuels into a universal system of energy production and storage for heating purposes, combined with cogeneration based on renewable energy sources. The created system will serve to stabilize and self-balance the local power system.

The project will implement a demonstration heat and power system to confirm the market feasibility of the combined heat and power system, which will provide electricity and heat from renewable sources with a minimum share of 80% renewable energy, while maintaining an acceptable price for the recipient.

Benefits of „CHP Plant in the local energy system”



Dissemination of renewable energy technologies in the Polish heat and power industry



Air and climate protection



Decarbonization and achieving climate neutrality



Net zero greenhouse gas emissions by 2050

The Grand Challenge: Energy. The final of the first Polish competition in the Grand Challenge formula.

The type of Grand Challenge competitions was initiated in 2004 by the American agency DARPA (Defense Advanced Research Projects Agency). The first Polish Grand Challenge was created to promote innovative solutions in the field of wind energy, but also to mark new paths to implement the ideas of Polish innovators. This is how a brave and completely different undertaking from the traditional competitions by the National Center for Research and Development was born, which met with the response of a large group of renewable energy enthusiasts.

The challenge was to develop a compact unit for individual use, capable of converting wind energy into electricity and storing it most efficiently. In this way, NCBR aims to reduce smog and greenhouse gas emissions, and to increase the use of renewable energy sources. The solution developed as part of the challenge will provide the possibility of access to electricity outside the grid and, above all, will contribute to savings in households. A wide range of participants was invited to develop such a solution - from scientists and entrepreneurs, through students and student clubs, to innovators or „garage-based” inventors and enthusiasts. Thanks to the open formula, minimum formalities and relatively low costs of developing a response to the challenge, each inventor had a chance to participate in the competition.

On October 15 and 16, 2021, the final of the „Grand Challenge: Energy” technological competition was held at the PGE Narodowy in Warsaw. Ten teams qualified for the final of the „Grand Challenge: Energy”, which tested their prototypes in a wind test lasting 6 hours, competing with each other for the best energy efficiency. The greatest amount of electricity was generated and delivered to the receiving installation by prototype of the MMB Team who won the Grand Challenge, winning a prize of PLN 1,000,000. Of all the semifinalists three teams were also selected to present the most interesting prototypes in terms of design. The best design was selected in an on-line voting conducted on the day of the final of the Grand Challenge. The prototype of the Panel Wiatrowy

Team received the highest number of votes, winning a design award of PLN 50,000 net.

During the final of the “Grand Challenge: Energy” ceremony, a conference on the European Green Deal strategy was also held. The initiative was financed from European Funds under the OP SG.

National Focal Point



National Focal Point in NCBR

From 1 November 2020, the National Focal Point for the EU Framework Program Horizon Europe (Department of NFP, DNFP) is part of the NCBR, where it is one of the three departments in the International Cooperation Office. The year 2021 was the first full year of functioning of the DNFP in the structure of the Center - a period of dynamic development of the potential of the expert team, adapting to the priorities and challenges of the new Horizon Europe (HE) program and conducting information and promotion activities towards external entities, aimed at identifying the DNFP as part of the NCBR.

National Focal Point in action

In 2021, the NFP Department carried out a number of information and consulting activities, such as information days, brokerage meetings, conferences, workshops and trainings. The „Europe. Horizon of Opportunity” conference was a spectacular event, organized in April 2021 in cooperation with DNFP for the launch of the new Framework Program. The conference, broadcast from the studio in Warsaw, gathered the most important actors of the R&I scene in Poland and the EU, including Maria Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth, Przemysław Czarnek, Minister of Education and Science, and many key experts from the European Commission. In carrying out the mission assigned by the European Commission, the so-called National Contact Points (title given to experts responsible



for particular areas of the Framework Program in the NFP), during the year, NFP experts provided over 16,000 consultations with potential applicants and organized 80 events for about 8 thousand people. Their nature, duration and the degree of substantive advancement and the content conveyed, addressed to various types of participants were very diverse. Two editions of the „Week with clusters”, including open information days with a wide range, concerning the entire thematic cross-section of the second pillar of Horizon Europe, attracted particular interest, as well as the innovative campaign „Horizon Europe for Business”, aimed at introducing enterprises to the full range of opportunities that this program opens up for them. The NFP department was also exceptionally involved in activities supporting applicants in obtaining prestigious grants awarded by the European Research Council. Unsatisfactory statistics from the previous program on the results of Polish units in this area were a clear signal that new forms of support and intensification of activities were necessary. We didn't have to wait long for the results of the work done in 2021. At the beginning of 2022, it was announced that as many as ten researchers working in Poland had obtained ERC Starting Grants, an unprecedented result.

In 2021, DNFP also started preparations for the implementation of the ERC Mentoring Initiative, an undertaking aimed at providing substantive

support to people planning to submit an application to the ERC. A unique system has been created, based on cooperation with the most important research and innovation funding agencies in Poland (NCBR, NCN, NAWA, FNP), coordinated by the DNFP NCBR.

The year 2021 is also a continuation of the cooperation between the NFP with the Ministry of Education and Science (MEiN) and the European Commission for the implementation of new solutions regarding project remuneration in Polish institutions. After the official commencement of the new EU PR, the proposed assumptions of the so-called PACT system were sent to the financial services of the European Commission, which finally confirmed its correctness in the context of the regulations in force in Horizon Europe. These activities were aimed at increasing the salaries of people implementing the projects, and thus significantly increasing the value of funds obtained by Polish institutions under Horizon Europe.

The NFP also prepared (in cooperation with NAWA) a strategy and an action plan for the development of the EURAXESS Poland Network. At the end of December 2021, in accordance with the decision of MEiN aimed at assigning tasks in accordance with the competences of individual agencies, handling of EURAXESS and the HE Maria Skłodowska-Curie Actions component was transferred to NAWA.

National support system - Horizontal Contact Points

In 2021, MEiN continued to finance the operation of the network of 10 Regional Contact Points (RPK), and the DNFP NCBR coordinated their operation. NFP experts took part in events organized by RPK and a joint training calendar was started. An important task entrusted to DNFP by MEiN was to conduct a cross-sectional analysis of the functioning of the national support network regarding the participation of Polish entities in framework programs. The analysis showed that the current RPK network requires better coordination, and the activities of points in the regions should focus on horizontal issues. The creation of the concept of a new network, its approval by MEiN and the commencement of the implementation of this restructuring was one of the key successes of the DNFP in 2021.

DNFP, for the first time in more than twenty years of network history, was entrusted with financing, which enables the effective coordination of the entire system. The competition for new Horizontal Contact Points was concluded in December 2021, and at the beginning of 2022, the network of six Horizontal Contact Points, consisting of a total of 12 entities grouped into consortia, became fully operational. On the basis of the system analysis carried out, the DNFP also proposed the creation of a parallel network of thematic points in Poland, which could be a response to the challenges related to partnerships in Horizon Europe, 50 large-scale initiatives requiring a significant mobilization of industry circles. This concept was also implemented: in 2022, MEiN established a network of 7 Industry Contact Points, affiliated with the institutes of the Łukasiewicz Research Network. Thus, a complete, new national support network started operating on the basis of solutions proposed by the DNFP.

National Focal Point on the international stage

Last year, DNFP actively conducted international expert activities by participating in the works of HE program committees and other expert bodies (e.g. for European partnerships), as well as prepared proposals for the positions of the Polish government in relation to documents consulted in the EU decision-making process. A strategically important element of the activities of the DNFP, possible to be implemented as a result of its incorporation into NCBR, was participation in works aimed at harmonizing national support instruments with the Horizon Europe and Euratom programs. DNFP experts cooperated intensively with experts from other Center units, introducing them to solutions functioning in EU programs and participating in shaping the assumptions of new operational programs and other initiatives. As shown by the examples of other EU Member States, the harmonization of the national and EU systems should be conducive to increasing the participation of domestic entities in the EU PR. In addition, DNFP provided continuous support to Polish institutions in searching for foreign partners for projects (through European networks, as well as by actively supporting the participation of Polish participants in international brokerage meetings). In 2021, DNFP participated in the preparatory work on 10 applications for HE networking grants, intended for consortia of National Contact Points. In this context, the activities related to the WIDERA project (from the area of the so-called Widening in HE), grouping about 30 foreign entities, coordinated by the DNFP NCBR, were particularly absorbing (the grant agreement was signed at the beginning of 2022). Another initiative that was prepared last year is the TRAMI project concerning the so-called mission in HE, to which DNFP joined together with DBRU.

Summary of Polish participation in the Horizon 2020 program

As a result of several months of work of DNFP experts dealing with statistics on one hand and substantive data analysis on the other, an extensive report was prepared - a detailed statistical analysis of the participation of Polish units in the Horizon 2020 (H2020) EU PR and a number of recommendations have been developed to increase Polish participation in the Horizon Europe program in 2021-2027. In total, 894 Polish institutions received a total of EUR 748.01 million for funding in H2020. This is over 1/5 of the funds that went to the 13 EU Member States that joined the Union together with Poland and in the following years. Polish scientists and entrepreneurs ranked 15th among the Member States and were a leader in the group of new Member States. The full 100-page report is available at www.kpk.gov.pl.

Partnerships

In 2021, the International Cooperation Department (ICD) of the NCBR undertook to coordinate nine partnerships, which are a new format of public-public cooperation, proposed by the European Commission under the Horizon Europe program:

- Sustainable Blue Economy Partnership – SBEP
- Key Digital Technologies – KDT
- European High Performance Computing – EuroHPC
- Innovative SMEs
- Driving Urban Transition – DUT
- Transforming health and care systems – THCS
- ERA4Health
- Water4All
- Clean Energy Transition Partnership – CETP.

Co-financed partnerships are one type of HE partnerships where a national financing agency becomes a member of the consortium. It is also a good example of the synergy of activities within the NCBR's International Cooperation Department. ICD NCBR, with the participation of DNFP, was responsible for conceptual work on the substantive scope of the above-mentioned nine initiatives, and also participated in the development of the budget. Some partnerships had to prepare applications submitted to the European Commission and only after their adoption was it possible to launch competitions for international research projects, i.e. the most important partnership activities implemented by the Center. Last year, ICD conducted the first recruitment in the Innovative SMEs partnership, as part of which it received 15 applications with the participation of Polish entrepreneurs. The results of the competition, as well as the planned announcements of further competitions under this and other partnerships, are expected already in 2022. Another task carried out by the Center last year was the partnership under the Euratom Program - European Partnership for research in radiation protection and detection of ionizing radiation. As in the case of Horizon Europe partnerships, NCBR was primarily involved in conceptual work aimed at submitting an application to the European Commission. In this partnership, the Center will be responsible for announcing and conducting three international competitions for R&D projects in the field of radiation protection. The first one will take place in 2022.

Other international activities

Horizon Europe Partnerships are not the only initiatives implemented by ICD NCBR under the aegis of the European Commission in 2021. Last year, ICD announced as many as 14 new competitions for international research projects as part of the ongoing initiatives of the previous Horizon 2020 program. The number of successfully submitted applications with the participation of Polish partners amounted to 222. On this basis, nine competitions were concluded, and 57 applications from Polish entities received a recommendation for project funding. The remaining competitions will be resolved in 2022.



The Client at NCBR

One of our values is client orientation of the NCBR Group. Along with the strategy adopted by the Center, we are gradually developing tools that make cooperation effective and adapted to current problems.

Since the beginning of the pandemic, we have launched a fully remote customer service process overnight. Ongoing processes and new activities were done remotely. We were one of the first institutions in the country to implement a number of improvements to ensure the continuity of the institution's work in a pandemic situation. In the past year, this process has been continued and improved.

With the new strategy, we have also become a knowledge market, providing our clients with expertise through our Landscape of Innovation publications and website reports. Responding to the needs of the market, the Center established the Think Tank, which is an advisory and opinion-forming body. We have successively promoted our beneficiaries, both on the website, in social media channels, and during live events. Thanks to this, we were able to present the achievements of Polish inventors to a wider audience, promoting the resulting products, technologies and services. The Center organized cyclical meetings in the Info Day formula, promoting new competition initiatives. During the meetings, potential beneficiaries could learn about the competition rules, funding issues and many other aspects necessary for effective application for NCBR funds.

Contact Center (CC) is NCBR's response to the needs of our clients

Along with the new NCBR strategy, we started work on the design and implementation of a new tool for efficient customer service in the Center. The need to obtain this type of solution resulted from the development of the Center's digitization process, unification of customer service standards and our work, as well as efficient supervision over the process of transferring

outbound information. The Contact Center is not only a modern tool, but also the entire information process covering the comprehensive activities of our institution. It is a kind of network connecting substantive departments with employees involved in CC service. The main idea of introducing CC to the functioning of the Center was the wide spectrum of our activities, the variety of programs, the digitization process and the response to the market needs resulting from the ongoing pandemic. The Contact Center is a tool that enables efficient monitoring of the process of providing broadly understood outbound information (telephone, written), maintaining proper service standards and high quality of the information provided. Thanks to the cooperation of all of us, customers will receive standardized information that meets the standards adopted in the Center, with appropriate deadlines. One of the first places where the clients of the Center arrive is the NCBR Information Point operating in the CC system. It is a place where people starting cooperation with the NCBR, as well as people who are already implementing their projects, contact us. In 2021, we had an average of 35 calls a day, and the statistical call lasted 3.5 minutes. In 2021, the Information Point answered over 8,000 phone calls (more than twice as many as in 2020) and handled over 10,000 e-mails (over 10 times more than in 2020), and conducted 10 online meetings. In total, people working in the CC system spent 567 hours, 36 minutes and 43 seconds on phone calls with our clients, helping to arrange matters and solve problems. The NCBR Information Point has become an obvious point of contact for our clients.

In 2021, we sent 53 outbound NCBR newsletters to over 22,000 of our subscribers (in 2020 we had over 18,500 subscribers and we sent a total of 42 outbound NCBR newsletters). In 2021, the NCBR granted a total of 96 patronages, including 62 honorary patronages (in 2020, the Center granted a total of 85 patronages, including 54 honorary patronages, 30 patronages and one scientific patronage).

NCBR in social media:

- In 2021, we published 558 posts on Facebook. The innovation community on social media continues to grow. At the end of 2021, the NCBR profile was observed by over 28.2 thousand users. Compared to 2020, this is an increase of 30%.
- The Twitter profile of the Center, where we published 682 posts, also enjoys unflagging interest. We also recorded an increase in the number of followers by 12.5% compared to 2020. At the end of 2021, the NCBR's Twitter was followed by almost 10,000 users, and this number is constantly growing. In addition to the content of the NCBR's competition offer and information about implemented projects, we reported live events that we organized and those in which our experts took part.
- The largest increase in the number of followers of the NCBR profile was recorded on LinkedIn. We co-create this profile together with the National Focal Point for EU Research Programs, operating in the structure of the NCBR since November 2020. In 2021, the profile was observed by over 22,000 people, thus we recorded an increase compared to 2020 by over 55%.
- In 2021, the NCBR YouTube channel had 3,316 subscribers, which was an increase of 30% compared to 2020. The total number of views on the channel is 275 972. Undoubtedly, such a large increase in the popularity of our channel is due to the successive episodes of the online NCBR training cycle and the films on applying for grants under the Horizon Europe program. In 2021, we also started cooperation with one of the most respected online opinion leaders in the science and technology category - Tomasz Rożek, PhD. The result of this cooperation is a series of films presenting green initiatives of the NCBR financed from European Funds.

The most important communication activities in 2021:

- Promotion of the Center's activities and selected beneficiaries' projects with the use of new marketing technologies (including e-mail marketing, continuation of SEO / SEM positioning).
- Coordination of communication activities in the NCBR Group and the launch of the channels of NCBR Investment Fund ASI S.A. (on Twitter and LinkedIn) and Ideas NCBR (on LinkedIn).
- Promotion of the offer of international NCBR competitions - intensification of communication in Polish and English on the occasion of the promotion of the INNOGLOBO competition in cooperation with embassies and Polish institutions based abroad.
- Ongoing update of the „Successes of our Beneficiaries” tab on the Centre's website - in 2021 the number of success pages of our beneficiaries exceeded 100 (in 2020 there were about 40 new pages added).

Beneficiary satisfaction monitoring

In 2021, the National Center for Research and Development conducted a customer satisfaction survey. The purpose of the survey was to analyze the level of satisfaction of NCBR beneficiaries with the service at subsequent stages of project implementation. A similar study was conducted in 2020. The results of the survey show an increase in the satisfaction of our beneficiaries with the handling of their projects by the Center. The percentage of respondents who agreed to the survey and completed the survey also increased.¹¹

¹¹ NCBR survey - Measurement of the satisfaction of the beneficiary with the handling of projects by NCBR. The survey is available at gov.pl/web/ncbr/zrealizowane2.

Purpose

Monitoring the level of beneficiary satisfaction at subsequent stages of the project

Assessment of the process of communication between beneficiaries and NCBR staff and project supervisors

Diagnosis of barriers and problems that arise during the implementation of projects

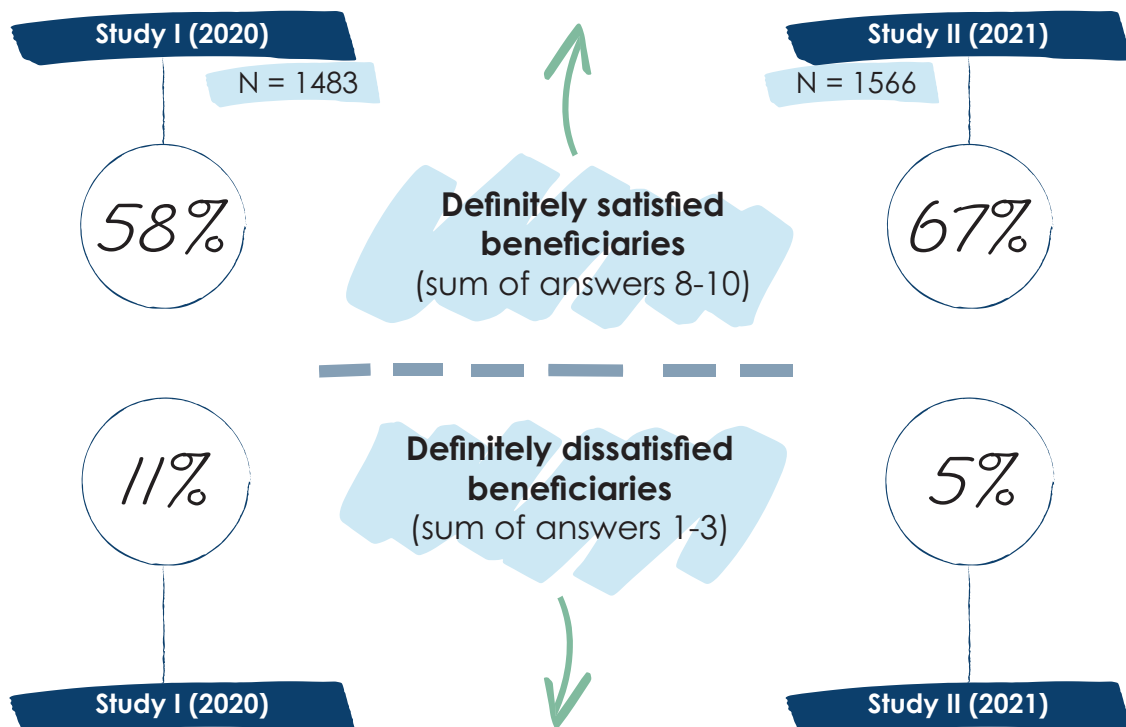
Estimating the scale of external support used by beneficiaries during project implementation

Assessment of the motivation of beneficiaries to re-apply for NCBR funding

Are the beneficiaries satisfied with NCBR's handling of the project?

The results of the survey show that in relation to 2020, the level of satisfaction of beneficiaries with project management at the Center has increased. The survey also showed a drop by over 50% in the number of definitely dissatisfied beneficiaries.

Beneficiaries who completed the satisfaction questionnaire first rated their overall satisfaction with NCBR's service of projects on a scale of 1 to 10. In 2021, the sample was carried out on a group of 1,566 people (N-1566), which is an increase compared to 2020, when 1,483 people took part in the study (N-1483).





Summary

In the NCBR annual report for 2021, we summarize the work of the Center, its main areas of activity, indicators and describe the processes that we have started with a view to more effective implementation of the tasks entrusted to us. 2021 was another year in which we operated in pandemic conditions. We have fully adapted the institution to the market needs and for our clients. In 2021, we took a number of initiatives to implement the European Green Deal. The competition offer was met with market interest, and the Centre's activities were noticed by the European Commission, which awarded us with the EUIPA award. This is another example of the implementation of tasks responding to global trends. We believe that the programs in modern pre-commercial procurement formulas will contribute to real changes in environmental protection and will make a significant contri-

bution to the country's energy transformation. Another important step of the National Center for Research and Development, corresponding to market needs, is to support the development of the area of artificial intelligence. The Center proposed an institutional solution by establishing the IDEAS NCBR company (part of the NCBR Group) at the end of December 2020. The company carries out R&D&I tasks in the field of artificial intelligence. The Center is facing new challenges related to the dynamically changing world. This is the time of a new financing perspective for 2021-2027. All actions that we have taken and are still taking will help to develop optimal tools to support the development of R&D and innovation in Poland. We trust that the result of our activity will be to encourage more innovators to take up difficult and interesting challenges.





The National Centre for Research and Development

Chmielna 69 Street

00-801 Warsaw, Poland

Phone: +48 22 39 07 401

gov.pl/NCBR

gov.pl/innowacje

Free copy

ISBN 978-83-960561-6-0

The project is co-financed by the European Union under
The European Regional Development Fund and the European Social Fund



European
Funds



Republic
of Poland



The National Centre
for Research and Development

European Union
European Structural
and Investment Funds

