

NCRD 2011





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Dear Sirs,

The year 2011 turned out to be a period of significant changes and challenges, dynamic growth of the offered program and organizational development for the National Centre for Research and Development. The science and higher education reform adopted in October 2010 brought new legal regulations, which i.e. entrusted to the Centre the task of developing strategic research and development programs. It was also a breakthrough to take over from the Ministry of Science and Higher Education the role of the intermediary body with regard to the following operational programs: Innovative Economy, Human Capital, Infrastructure and Environment.

Throughout the whole year we worked hard on new programs – INNOTECH, GRAF-TECH, Applied Research Program or sector program for the aviation industry. Committed to the constant expansion of our offer, we are willing to face new expectations of scientists and businesses and adapt our activities to changes occurring in the contemporary world. We also attempt to react as quickly as possible to the needs of the Polish economy, which is exemplified in the convention concluded with the Polish Aerospace Technology Platform and initiation of development of a shale gas recovery technology program.

As a result, the range of our tasks and obligations expanded significantly, which is best reflected in the Centre's budget and number of our staff which have more than doubled. To rise to the challenge, we had to make many efforts targeted at efficient implementation of the aforementioned programs, the most important of which was the reorganization of the Centre itself. We did our best, however, to make the changes we were implementing the least bothersome to our applicants and beneficiaries possible while hoping that future benefits will make up for temporary inconveniences.

In 2011, we focused a lot on the implementation of solutions friendly to our beneficiaries. We managed, at least to a large extent, to simplify procedures related to calls for proposals. We began working on the standardization of the aforementioned calls for proposals, implemented the e-PUAP platform through which we can communicate with stakeholders and opened a new website, which is more user-friendly.

We could not have achieved all that, if it had not been for a complete involvement of over 200 employees of the Centre, whom I would like to thank for the efforts made in order to accomplish the tasks entrusted to the Centre.

I kindly invite you to read the following publication whose purpose is to present the operations performed by the National Centre for Research and Development in 2011 as well as to cooperate with us on the implementation of research programs.

prof. Krzysztof Jan Kurzydłowski
DIRECTOR OF THE NATIONAL CENTRE FOR RESEARCH AND DEVELOPMENT

Dear Sirs,

The Council of the National Centre for Research and Development entered the year 2011 in a new composition. The Council elected for the second term was granted new powers, conferred to it under new regulations determining the fundamentals of its operations. Those changes were introduced by way of the science reform adopted in 2010, which turned out to be of utmost importance to the Centre.

It was highly significant to assign to the Council the development of strategic research and development programs, which, prior to that new regulation, used to be the task of the Minister of Science and Higher Education. The development of strategic programs, whose purpose is to affect the economic growth and civilizational development of our country, is the fundamental and most important duty of the Council, which, in addition, supports, with its advice and opinions, the Director of the Centre in the management of this institution, which is extremely important to the Polish science.

While addressing those words to you in the mid-2012, I am very pleased to inform you that the Minister of Science and Higher Education – Ms Barbara Kudrycka – authorized the implementation of the first strategic program developed by the Council. The program is called „Prevention and treatment of civilization diseases – STRATEGMED” and its purpose is to make use of R & D results to push ahead the combatment of civilization diseases and development of the regenerative medicine. The program's realization time is five years, while its budget amounts to PLN 800 MM. We also expect that its implementation shall strengthen the international position of Poland as a country involved in R & D within the areas of medicine covered by the program, hope for the establishment of strong and dynamic research teams composed of scientists from different countries and transfer of know-how and state-of-the-art technologies within the scope of prevention, diagnostics, therapy and rehabilitation from Polish scientific units to our economy and National Health Service to the benefit of everybody.

The approved program is a result of long months of work initiated in 2011 and carried out by the Council and team of experts. At the same time, it is the beginning of a much bigger challenge – implementation. We will keep you informed on the implementation progress in the upcoming year.

prof. Jerzy Kątciki
PRESIDENT OF THE COUNCIL OF THE NATIONAL CENTRE OF RESEARCH AND DEVELOPMENT

Who are we and what do we do?

The National Centre for Research and Development (NCRD) was founded in the summer of 2007 to accomplish tasks aimed at the implementation of science, science and technology and innovation-related policies of the State. The science and higher education reform adopted in 2010 re-shaped the Centre by assigning to it new, much broader powers and duties. Currently, the Centre operates on the grounds of the Act from 30 April 2010 on the National Centre for Research and Development.

The main duty of the Centre is to encourage Polish scientific units and businesses to develop and implement state-of-the-art solutions and technologies which increase innovation, and, by the same means, the competitiveness of our economy. The Centre's operations are targeted at the reinforcement of cooperation between Polish business circles and scientists and intensification of the commercialization of research results. While striving for the accomplishment of those goals, NCRD must also make the best use possible of the public financial resources spent on R & D so that they bring to the State as many benefits as possible.

The aforementioned tasks are accomplished through the development and administration of national and international research and development programs. The Centre co-funds the most valuable projects selected as a result of calls for proposals and then watches over their implementation.

The most important programs under our wings include strategic research and development programs. In 2011 NCRD was managing two programs of this kind:

- „Advanced energy recovery technologies” – which include pure carbon and biomass fuel generation technologies,
- „Interdisciplinary system of interactive scientific and scientific technical information” – whose purpose is to create a platform enabling access from one and the same site to all the knowledge resources available over the Internet.

The aforementioned programs will soon be joined by another one called „Prevention and treatment of civilization diseases – STRATEGMED”. It was developed by the Centre's Council under the National Research Program established by way of a Government Resolution adopted in August 2011. That document determines long-term areas of research and development, strategic to the Polish State. The new program is a response to one of seven re-

search priorities set forth in the National Research Program, called „civilization diseases, new medicines and regenerative medicine”.

In addition, the Centre manages the implementation of three other strategic research programs: „ Integrated System for Reducing Energy Consumption in the Maintenance of Buildings, „Work Safety Optimization in Mines” and „Safe Nuclear Power Engineering Development Technologies”.

Another important task pursued by the Centre consists in the performance, in cooperation with the Minister of Defense and Minister of Internal Affairs, of actions related to research targeted at national security and defense. It is worth mentioning that instead of including exclusively military projects or those which target uniformed services, they also provide solutions for safety issues in a broad sense, such as i.a. issues related to work safety or safety of industrial facilities.

Another priority of the Centre is to provide scientific staff with good career opportunities, with a special focus on supporting young scientists. This goal is pursued within the framework of the Human Capital Operational Program and LIDER program under which the Centre supported in 2011 59 young researchers.

Among undertakings managed by the Centre, a special attention must be given to programs which encourage R & D. In 2011, the first call for proposals was held for the new program called INNOTECH, oriented to the support for projects using highly and moderately advanced technologies, split into two program paths: In-Tech (funding for innovative ventures) and Hi-Tech (funding for state-of-the-art technology ventures). In the meantime, works on other programs were initiated such as e.g. funding program for projects offering huge development opportunities, called „Applied Research Program”, or program of development of graphene-based innovative solutions – GRAF-TECH.

While accomplishing its mission, the Centre cooperates with other entities. In search of the most effective support for pro-ecological technologies, the Centre signed an agreement with the National Fund for Environmental Protection and Water Management aimed at taking joint actions with this regard. Commitment to the synergy effect was also at the root of the cooperation with Agencja Rozwoju Przemysłu S.A. striving for the increase of in-

novation of our economy and degree of implementation and commercialization of research results. The first effect of the aforementioned cooperation was the commencement of works on the sector program of development of original shale gas recovery technologies.

Sector programs constitute a new solution offered by the National Centre for Research and Development, which, from the very beginning, has generated a lot of interest. It is because programs of this kind are a direct response to the expectations of businesses representative of specific economic sectors, which start cooperating with the Centre throughout the implementation stage. Such a solution provides for a better use of resources and enables a higher degree of commercialization of R & D results. The first initiative of this kind was the initiation of cooperation with the Polish Aerospace Technology Platform aimed at implementation of R&D programs for the aviation industry. NCRD started the same kind of cooperation with the Polish Technology Platform for Innovative Medicine, which associates Polish companies from the medical sector.

It is of a great importance to the Centre to pursue international cooperation. In 2011 NCRD also funded research conducted as a result of several international calls for proposals (i.a. ERA-NET CHISTERA for quantum information technology, ERA-NET MATERA for materials science, ERA-NET MNT and JU ENIAC for nanoelectronics, ERA-NET EuroNanoMed for nanotechnologies in medicine and ERA-NET NEURON and JP Neurodegenerative Disease for neurology). The Centre responded to the international call for proposals called CORNET Initiatives as well. NCRD also follows bilateral initiatives together with

Israel, Germany, Luxemburg, Singapore and Norway and participates in the international research program AAL.

Besides, the Centre accomplishes tasks entrusted to it by the Minister of Science and Higher Education related with IniTech Enterprise and Technology Initiative I, Multiannual Program „Optimization of Work Safety and Conditions”, Multiannual Program „Polish Artificial Heart” and international programs such as ERA-NET and EUREKA Initiative. NCRD also runs Patent Plus program, which encourages an optimization of effectiveness of intellectual property management through patents and Innovation Creator which strives for an increase in use by businesses of innovations developed by Polish researchers.

Since 1 September 2011 the National Centre for Research and Development has been an intermediary body for three operational programs: Innovative Economy, Human Capital and Infrastructure and Environment, funded by structural funds. The tasks assigned to NCRD impose on the Centre the obligation to implement them efficiently by means of organization of calls for proposals or applications for funding, allocation and settlement of granted financial resources and to provide beneficiaries who implement projects funded by the European Union with substantial advice. The aforementioned kind of grants have been used to finance many projects, including those which enabled Polish students and scientists to gain access to modern research infrastructure and equipment.

The proper accomplishment of the aforementioned tasks is supervised by the Director of the Centre, assisted by the Council of the National Centre for Research and Development.

Management Board of the NCRD

The National Centre for Research and Development is headed by the Director who presides over the Centre's operations and is held accountable for the correct and efficient execution of tasks entrusted to NCRD. His main duty is to make decisions on matters related to the management and allocation of financial resources granted for the implementation of strategic R & D programs and performance of other operations. The Director acts on behalf of the Centre and represents it before third parties. In addition, he bears responsibility for the Centre's finances and management and administration of its property and assets.

Director of NCRD – prof. Krzysztof Jan Kurzydłowski, DSc, Eng.



Professor Krzysztof Jan Kurzydłowski graduated from the Warsaw University of Technology. He was awarded the title of professor in 1995. In 1993-1999 he occupied the position of Vice-Rector of the Warsaw University of Technology, where, in 1999-2003 he headed the Faculty of Materials Science.

His scientific interests focus mainly on nanomaterials engineering. Over 400 reviewed articles authored by him have been published in leading scientific reviews with an international reach. He also authored or co-authored five monographs, three of which have been translated into English. As a manager or team member, he has also participated in numerous domestic and international research projects implemented in cooperation with business partners. He has cooperated with business representatives as an expert and scientific advisor. Prof. K. J. Kurzydłowski is a member of many international associations and organizations and seats in e.g. International Advisory Board of NIMS – National Institute of Materials Science (Japan).

In 1991-1993 he used to be the director of the Business Development Centre at the Warsaw University of Technology. In 1993-1996 he was the director of the Polish Higher Education-Business Forum. He also seated in supervisory boards of companies owned by the State Treasury.

Prof. K. J. Kurzydłowski has gained lots of experience in public administration. He presided over the Council of the Technology Agency, occupied the function of President of the Research Commission for the Development of the Economy, Deputy President of the Scientific Research Committee and Vice-President of the Scientific Council. From November 2005 to December 2007 he was the Undersecretary of State in the Ministry of Science and Higher Education.

He was appointed as the Director of the National Centre for Research and Development on 1 January 2011.

Deputy Director of NCRD – Leszek Grabarczyk



He graduated from the Catholic University of Lublin where he majored in law and history. He is also a graduate of the Prime Minister's National School of Public Administration.

In 2004-2007 he occupied various functions in the Ministry of Science and Higher Education, i.a. Deputy Director of the Science Strategy and Development Department. From January 2009 to March 2011 – Director of the Implementation and Innovation Department of the Ministry of Science and Higher Education, responsible for the implementation of Innovative Economy and Human Capital Operational Programs, development and implementation of other programs enhancing innovation, commercialization of research results, coordination and monitoring of actions taken by some of the institutions involved in supporting R&D and innovation.

He occupied the position of the Deputy Director of the National Centre for Research and Development from July 2007 to December 2008. He was nominated Deputy Director again on 4 April 2011.

Council of the NCRD

The Council of the National Centre for Research and Development is one of the Centre's three bodies. Its main duties include the development of projects of strategic research and development programs which are then submitted to a minister responsible for science for approval. In addition, the Council also acts as an advisory and opinion-forming body.

The Council expresses its opinions in the following areas:

- project of the Centre's annual financial plan;
- project of the Centre's annual operational plan;
- occasional reports and final report from the implementation of scientific research and development programs except for those related to the national security and defense;
- Centre's annual financial statement;
- annual report on the Centre's operations;
- accomplishment of other tasks entrusted to the Centre.

The Council has also the right to decide on the management of the Centre's property.

The aforementioned science reform adopted in 2010 awarded the Council with the right to develop strategic research and development projects. Those strategic programs can be developed on the grounds of the National Research Program, which defines R&D areas strategic for the goals and assumptions of the State's science-technology and innovation policies and was established by the Government in the resolution no. 164/2011 adopted on 16 August 2011. As soon as it had been adopted, the Council of the Centre started working intensely on the first strategic program developed according to the new regulations. The program's topic corresponds to the second of the interdisciplinary R&D areas listed in the National Research Program – civilization diseases, new medicines and regenerative medicine.

At 11 meetings held in 2011 the Council discussed new research management solutions and principles enhancing the expansion of both Polish science and economy. Diversified composition of the Council which comprises representatives of scientific, socio-economic and administration environments provides the Centre's programs submitted for approval with a comprehensive analysis and many precious remarks.



Composition of the Council of NCRD

Pursuant to article 12 section 1 of the Act on NCRD, the Council comprises 30 individuals designated by the Minister of Science and Higher Education. Ten of its members are selected among the candidates suggested by scientific circles who have been awarded at least the doctoral degree and are actively involved in research or development works. Other ten members are selected among career pursuing candidates suggested by ministers responsible for the following areas: spatial management and housing, economy, communications, science, agriculture, transport, internal affairs, health and national defense and among public administration officers responsible for scientific matters.

The Council is elected for a 4-year term with half of its members replaced once in every 2 years. It is impossible to be elected to the Council for more than two terms.

1. Members proposed by scientific circles:

- Piotr Garstecki, DSc,
- prof. Kazimierz Jeleń, DSc,
- prof. Jerzy Kątczycki, DSc, Eng.,
- prof. Andrzej Kowalczyk, DSc,
- prof. Jan Lubiński, DSc,
- prof. Antoni Waldemar Morawski, DSc, Eng.,
- prof. Dariusz Jan Skarżyński, DSc,
- prof. Wiesław Stręk, DSc,
- prof. Jan Taler, DSc, Eng.,
- prof. Piotr Tryjanowski, DSc.

2. Members proposed by socio-economic and financial circles:

- Marek Darecki, DSc,
- Zbigniew Dworzecki, DSc, Eng.,
- prof. Andrzej Górak, DSc, Eng.,
- prof. Leon Gradoń, DSc, Eng.,
- prof. Lech Czarnecki, DSc, Eng.,
- Karol Lityński, DSc, Eng.,
- Aleksander Nawrat, DSc, Eng.,
- prof. Janusz Rachoń, DSc, Eng.,
- Janusz Rymsza, DSc, Eng.,
- prof. Krzysztof Sacha, DSc, Eng.

3. Members proposed by ministers:

- Piotr Styczeń – by the minister responsible for spatial management and housing,
- Grażyna Henclewska – Undersecretary of State in the Ministry of Economy, proposed by the Minister of Economy,
- counsel Kazimierz Mordaszewski – proposed by the Minister of Communications,
- prof. Maria Elżbieta Orłowska, DSc – proposed by the Minister of Science,
- Marek Cieśliński, PhD, Eng. – proposed by the Minister of Agriculture,
- Małgorzata Typko – counsellor to the Minister of Environment, who proposed her for a member of the Council
- prof. Juliusz Engelhardt, DSc – proposed by the Minister of Transport,
- inspector Radosław Chinalski¹ – proposed by the Minister of Internal Affairs,
- prof. Roman Danielewicz/Janusz Kleinrok, DSc – proposed by the Minister of Health,
- colonel Józef Makuchowski², PhD, Eng. – proposed by the Minister of Defense.

The second-term Council is presided by prof. Jerzy Kątczycki, DSc, Eng., whose deputy is prof. Leszek Czarnecki, DSc, Eng.

In 2011 no more than one member of the Council was substituted. On 1 September 2011 the Minister of Science and Higher Education dismissed prof. Roman Danielweicz, DSc., and appointed to his position Janusz Kleirop, DSc.

¹ Replaced by the junior inspector Adam Wieczorek, MSc, Eng.

² Replaced by divisional general, pilot Leszek Cwojdzński, PhD

President of the Council NCRD – prof. Jerzy Kącki, DSc, Eng.



Professor of technical sciences. Deputy Director for Scientific Affairs of the Institute of Electron Technology. Graduate from the Faculty of Mechanical Engineering at the Warsaw University of Technology (specialized in semiconducting materials technology). Having completed doctoral studies at the Institute of Materials Science, Warsaw University of Technology in 1982, he defended his PhD thesis for the purposes of which he investigated how much the structural excellence depends on parameters of the crystallization of silicone tapes out of which solar cells are made.

In 1986-1987, he worked as a postdoctoral fellow at the Department of Materials Science and Engineering, Cornell University, Ithaca, NY, USA. Research on crystal lattice defect generation in semiconducting instruments production processes brought to fruition his habilitation thesis. He was awarded the degree of Habilitated Doctor of Technical Sciences in 1990. He became a Professor of Technical Sciences in 2000.

In 1996, he was granted a fellowship by the Japanese Society for Promotion of Science at the Kyoto Institute of Technology, Japan. He was in charge of scientific cooperation with such entities as Max-Planck Institut für Metallforschung (Stuttgart, Germany), Massachusetts Institute of Technology, Cambridge, MA (USA), Kyoto Institute of Technology (Kyoto, Japan) and IMEC (Leuven, Belgium).

He has authored or co-authored over 150 articles published in international scientific journals so far and has spoken at numerous conferences on semiconducting materials science, nanotechnology and materials testing methods. He prepared a monograph on the electron microscopy of semiconducting materials and instruments and has given 10 lectures as an invited speaker. He managed national research projects and was in charge of R & D projects carried out in ITE within the confines of the EU Framework Programme on electronic and photonic nanotechnology.

For much time, he has been evaluating European Union's Framework Programme projects within the domains of ICT, FET and NMP. He represents Poland in the High Level Group of EU Member States and FP7 Associated States on Nanoscience and Nanotechnologies and Governing Board of ENIAC Joint Undertaking.

In November 2010 he was nominated by the Minister of Science and Higher Education to the Board of the National Centre for Research and Development, in December 2010 he was elected the President of the Council.

Vice-President of the Council NCRD – prof. Lech Czarnecki, DSc, Eng.



Head of the Chair of Construction Materials Engineering at the Warsaw University of Technology, Scientific Secretary, Vice-President of the Scientific Council at the Building Research Institute. Vice-Rector for education in 2002–2005.

Author or co-author of over 200 publications and owner of 35 patents. Holder of numerous awards granted by the Minister of Science and Higher Education and Minister of Construction. Awarded with the Knight's Cross of the Order of Polonia Restituta and National Education Medal.

Works conducted by the National Centre for Research and Development

The Council's works were upheld by commissions recruited from among the Council's members:

1. Financial Commission

The Commission prepares for the Council draft opinions on the Centre's financial management, its financial statements or consents to be granted by the Council for the disposal of assets whose value exceeds EUR 250 000.



President of the commission: Janusz Rymsza, PhD, Eng.

Doctor of Technical Sciences. Deputy Director of the Research Institute of Roads and Bridges in Warsaw. Author of the method for determining the load capacity of bridges, introduced for use on national roads in 2004 by the General Directorate for National Roads and Motorways and the method for determining the military class load capacity MLC bridges, which was introduced in 2005 by the Minister of Infrastructure on public roads in Poland.

2. Commission for Strategic Research and Development Programs

The Commission develops strategic program projects which the Council submits, to the Minister of Science and Higher Education for approval. It also prepares for the Council draft opinions on matters related to the implementation of strategic programs.



President of the commission: prof. Piotr Tryjanowski, DSc

Professor of life sciences, director of the Zoology Institute at the Poznań University of Life Sciences, graduate of the Faculty of Biology, Adam Mickiewicz University in Poznań. He is specialized in agricultural sciences, ecology, parasitology, impact of investment projects on living beings, and climate's influence on living organisms.

3. Commission for the Implementation of Other Tasks

The Commission's duties include the formulation of the Council's opinion projects and decisions on the NCRD's tasks other than strategic research and development programs and research within the area of national security and defense.



President of the commission: prof. Dariusz Jan Skarżyński, DSc, DVM

Professor of veterinary sciences, Deputy Director for research at the Institute of Animal Reproduction and Food Research, expert in biology and reproductive pathology who graduated from the Faculty of Veterinary Medicine of the Warmia and Masuria University in Olsztyn (1988). His main research interests lie in immuno-endocrine mechanisms involved in the regulation of ovarian cycle, pregnancy and labor.

4. Appeal Commission

It is designated to hear appeals filed from decisions made on the allocation or refusal of financial assets for a project or funding promise.

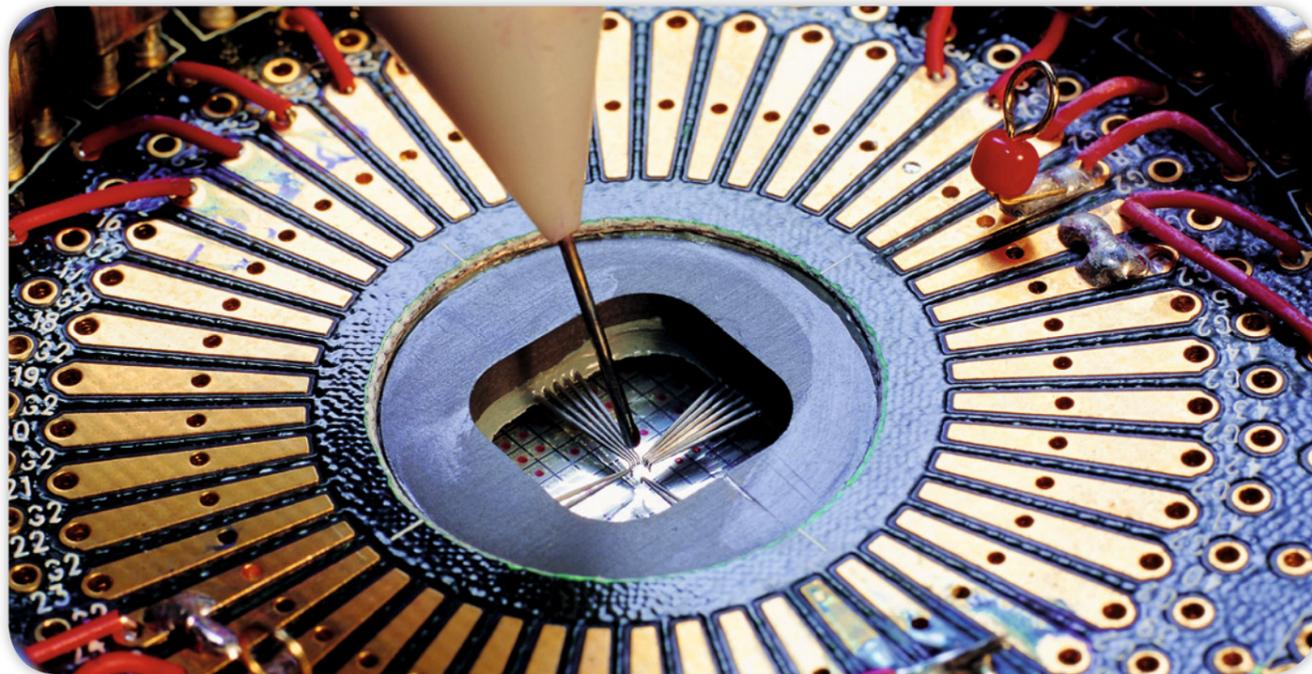


President of the commission: prof. Jan Lubiński, DSc

Professor of medical science, Head of the Chair of Oncology and Department of Genetics and Pathology at Pomeranian Medical University in Szczecin. In the years 1998-2011 a national consultant in the field of clinical genetics. His research interests focus on clinical genetics of cancer.

³ Currently it is prof. Krzysztof Sacha, DSc, Eng. who acts as the President.

Thousands of innovations



Presently, NCRD supervises about 3000 projects connected with scientific researches, which comprise undertakings at various scales.

The largest project is Dolnośląskie Materials and Biomaterials Centre (Dolnośląskie Centrum Materiałów i Biomateriałów), carried out by Wrocławskie Centrum Badań EIT+ Sp. z o.o. The value of the project is about PLN 611 million, where PLN 427 million comes from the European Union Operating Programme Innovative Economy.

These resources are used for creation of a complex of over 60 modern laboratories with the total space of about 24 thousand square meters in the capital of Lower Silesia (Dolny Śląsk). According to the plans, this complex is going to be the regional innovation centre. The scientists will carry out biotechnological research, work on advanced medical technologies and innovative materials, including nanomaterials. The centre will also host research works connected with preventing climate changes.

This large undertaking will constitute an excellent base for performance of numerous future projects that could significantly change our life and provide Poland with various innovative technologies.

However, the centre in Wrocław is only one of many places in Poland where works on modern technologies are

conducted. Hundreds of scientists conduct their projects in a number of universities and research institutes. The smallest projects have a value not exceeding PLN 100 thousand. However, this does not mean that such projects are less important, simply that sometimes performance of important and innovative research does not require much financial outlays.

It is not possible for us to present all projects. Therefore, on the following pages we will present only the selected ones. We divided them into five domains: new technologies for companies, health, energy and ecology, safety, education and science. This way, we wish to present a variety of issues that are dealt with by Polish scientists under supervision of NCRD, and give the idea of how much can change because of their work.

Sometimes such changes will affect almost all citizens of Poland, as for example in the case of research concerning clean coal technologies, which are supposed, among others, to protect us against significant increase of energy prices. Some research concerns only some people, but can be very important for them. Such is the case with the Polish Artificial Heart project or works on Speaking Maps for visually impaired persons. The results of such projects may save human lives or provide significant improvements. As you can see, science offers hope for a better future.

New technologies for companies

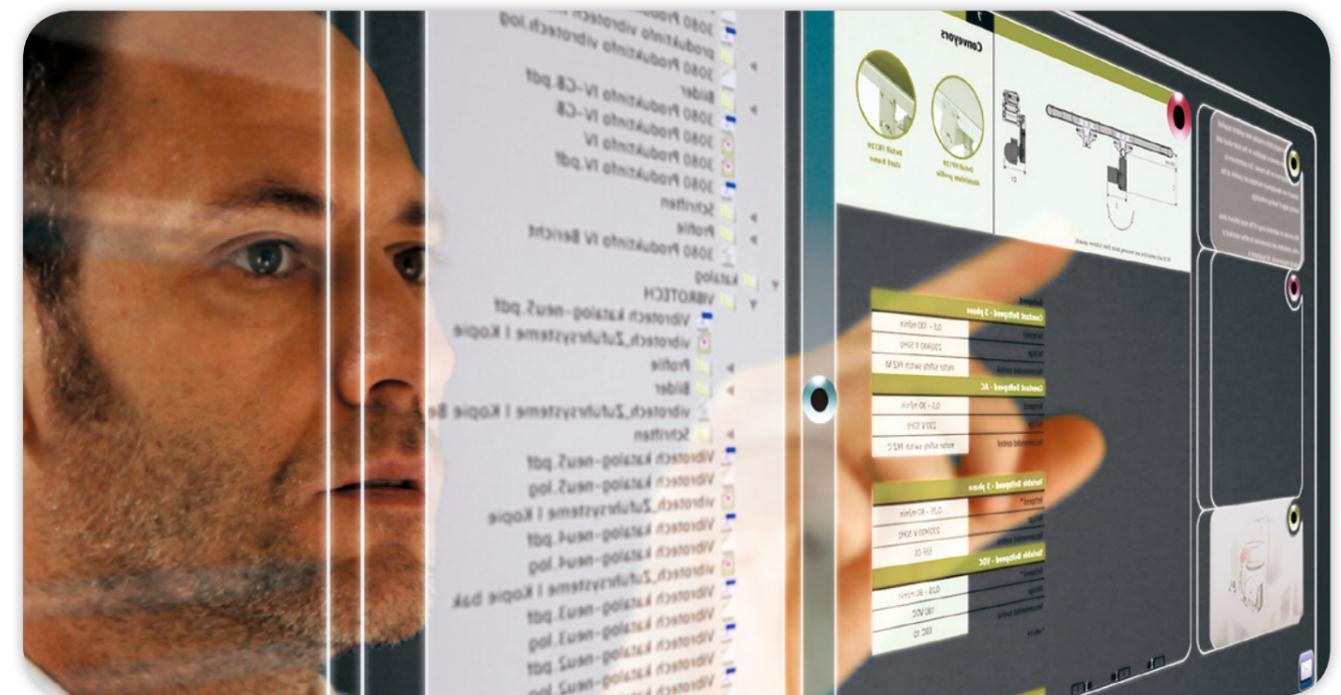
One of the most important targets of NCRD is to encourage cooperation of Polish scientists with companies and enterprises. Scientific research is the most beneficial if its results can be applied in practice and what is more, bring profits for the state and the companies.

Therefore, a large number of NCRD's undertakings concerns projects providing new technologies to Polish companies, as in the case of INNOTECH, started in 2011, which supports Polish companies and scientists in joint performance of innovative projects. The great interest in the first competition of INNOTECH proves that such programmes are much needed – NCRD received 787 applications.

Another excellent evidence of necessity of such actions is the project connected with development and launching production of blades for low pressure turbines being a part of Genx-2B engine. Because of the received support, the Avio Polska company from Bielsko-Biała developed and manufactures the element of one of the state-of-the-art aircraft engines used in large passenger Boeing aircrafts.

NCRD devotes a lot of attention to providing modern materials to Polish companies. For example, the project named „KomCerMet”, described on the following pages, is aimed at developing ceramic and metal composites and nano-composites for the purposes of aviation and motorization industry. In 2011, NCRD also prepared a support programme for research concerning application of graphene – a form of carbon discovered only a few years ago. It is possible that graphene may start a revolution in computers and other electronic devices. The GRAF-TECH programme should put the Polish companies at the front of such a revolution.

In order to learn more about the needs of the Polish manufacturers, NCRD maintains close cooperation with them. The agreement with the Polish Aviation Technological Platform from 2011 and the arrangements with the Agency for Enterprise Development will allow for better adjustment of research programmes to the existing needs and, therefore, will ensure higher effectiveness of spending financial resources.



New materials for transport

Creation of materials, which are more useful than their predecessors, is one of the most significant innovations, although for most people, changes in this regard are usually invisible. In fact, searching for new materials marks the most significant steps in development of our civilization. At the same time, the imperfections and defects of materials have led to many catastrophes, and at present, they still generate losses in industry. Therefore, there is a constant demand for new technologies.

A consortium of eight Polish scientific institutes and universities and four industrial partners is now working on new materials, combining ceramics and metal. The project „Ceramic and Metal Composites and Nanocomposites for Aviation and Motor Industry KomCerMet” is aimed at designing materials, which could replace the ones used so far (such as steel, cast iron) in some components of cars and airplanes. The exemplary applications of these materials include aircraft engine turbine blades, combustion engine valves and pistons, brake disks and blocks and couplings. On the other hand, self-lubricating nanocomposite KomCerMet coatings may minimize friction between cooperating components (such as pins, slide bearings”).

Project title: **Ceramic-metal composites and nanocomposites for Aircraft and Motor Industry „KomCerMet”**

Beneficiary: **Institute of Fundamental Technological Research**

Project value: **23 360 000 PLN**

Implementation period: **October 2008 – June 2013**

Support area: **Operational Programme Innovative Economy, Measure 1.3 Support for R&D projects for entrepreneurs carried out by scientific entities**



IPPT PAN.



A new supercomputer at IPPT PAN.

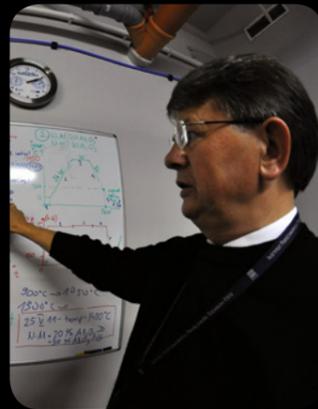
Research, conducted since the late 2008, have brought many effects. The scientists have designed many interesting composite materials based on aluminum, copper, chromium, molybdenum and nickel, strengthened by corundum ceramics or silicon carbide, in some cases with addition of rhenium. These show much better properties in comparison with the materials used now (including much higher resistance to friction, chemical corrosion, stress, good thermal conductivity, lower specific gravity). Similarly, in the group of composite coatings, nickel-tungsten-corundum material systems have been obtained, which may be competitive to hard chromium coatings used in aviation industry. Low friction coatings have also been devised on the basis of amorphous carbon, which have friction reduced several times in comparison with materials used in the motor industry.



Laboratory for nondestructive research on characteristics of materials.



Laboratory of Advanced Composite Materials of IPPT-PAN.



Interview with engineer Michał Basista, Ph. D.,
of the Institute of Basic Problems of Technology of the Polish Academy of Sciences.

Why is it a good idea to combine ceramics and metals?

The most significant weaknesses of technical ceramics include low tensile strength and low crack resistance (brittleness). In order to maintain the advantages of ceramics, while, at the same time, minimizing the effects of these weaknesses, new technologies of production of ceramic and metal composite materials have been devised. Adding of the second phase, consisting of fibers or particles of ductile metal, results in a substantial increase in crack resistance of the composite; at the same time, we can take advantage of the valuable properties of ceramics, such as resistance to high temperatures or low grindability.

Composites containing ceramics are also characterized by lower specific gravity in comparison with materials that are currently used. Therefore, their application may, for instance, reduce fuel consumption.

What can be the advantages of your research for ordinary people?

New structural and functional materials, which are lighter, more durable, more environment-friendly in comparison with the ones currently used are demanded in many branches of industry, which exert impact on the quality of human life. The transport industry is a good example here. Composite materials, such as ceramics-metal, allow for lengthening of the life cycle of structural components, increasing of working temperature of engines and their rotational speed, lengthen the planned inspection and repair time intervals and reduce the emission of pollutants (such as flue gases or products of wear and tear of brake blocks in millions of vehicles in Poland). More reliable materials will also ensure increased safety of transport.

What are the problems that we still have to overcome?

Among many technologies of composite production, which we developed in the project for three years, we have selected those, which provide materials with the best properties. In the fourth year of the project implementation, we are now working on the details of these technologies to obtain composites and coatings showing repeatable properties. A problem, which will have to be faced during the fifth year of implementation, will be finding of industrial companies in Poland, which, apart from initial interest and declarations of cooperation, would be really willing to apply the KomCerMet materials in the selected structural components.

Another problem can be associated with launching of mass production of KomCerMet composites, since these materials have never been used in aviation and motor industry in Poland. It should be kept in mind that apart from excellent technical properties, these materials must be attractive from the economic point of view as well. This is particularly significant in the motor industry.

Talking Maps for blind people

There are over 35 millions of blind and over 130 millions of partially-sighted people. Against common opinions, not all of them have their other senses especially skilled (e.g. hearing) that results in their limited capabilities to receive information conditions and environment they are surrounded by.

In order to exist in normal and self-reliant way blind and partially-sighted people need various accessories: white canes, magnifying glasses, specially customized typewriters, watches, various kinds of sensors and testers and computers. Help of an assistance dog is far beyond to be overestimated.

Properly equipped and trained blind people can exist self-reliantly: they go by buses and trams and walk on streets, thus they can run their errands or get to workplaces.

Technological development gives the opportunity to implement further facilities for blind people. The scientists from the Electronics, Telecommunications and IT Faculty of the Gdańsk University of Technology in co-operation with the company OPEGIEKA from the city of Elbląg are finishing their work on the system called Talking Maps. This

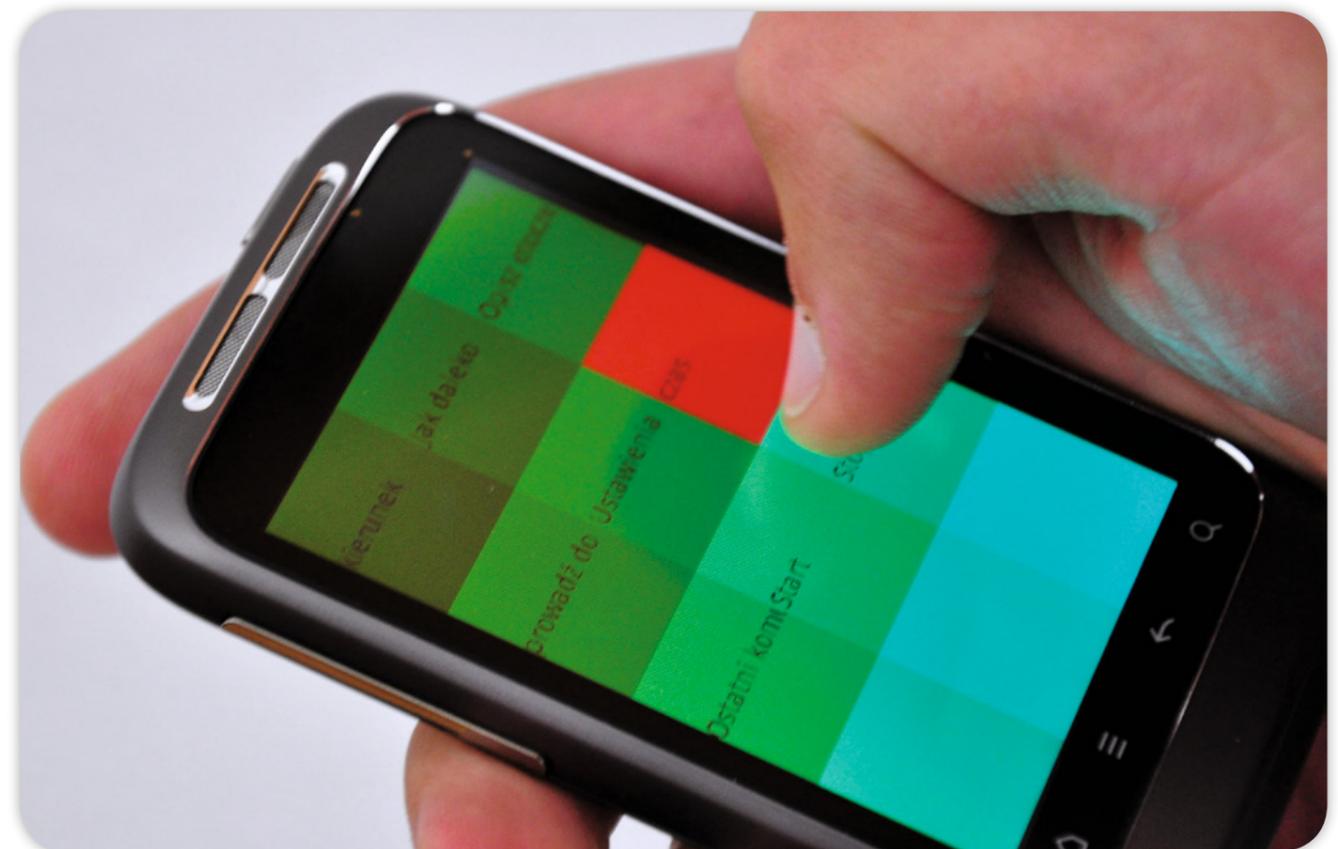
Project title: Talking Maps – a GIS system to support movement of the blind in urban areas

Beneficiary: Gdansk University of Technology

Project value: 4 040 000 PLN

Implementation period: April 2010 – June 2013

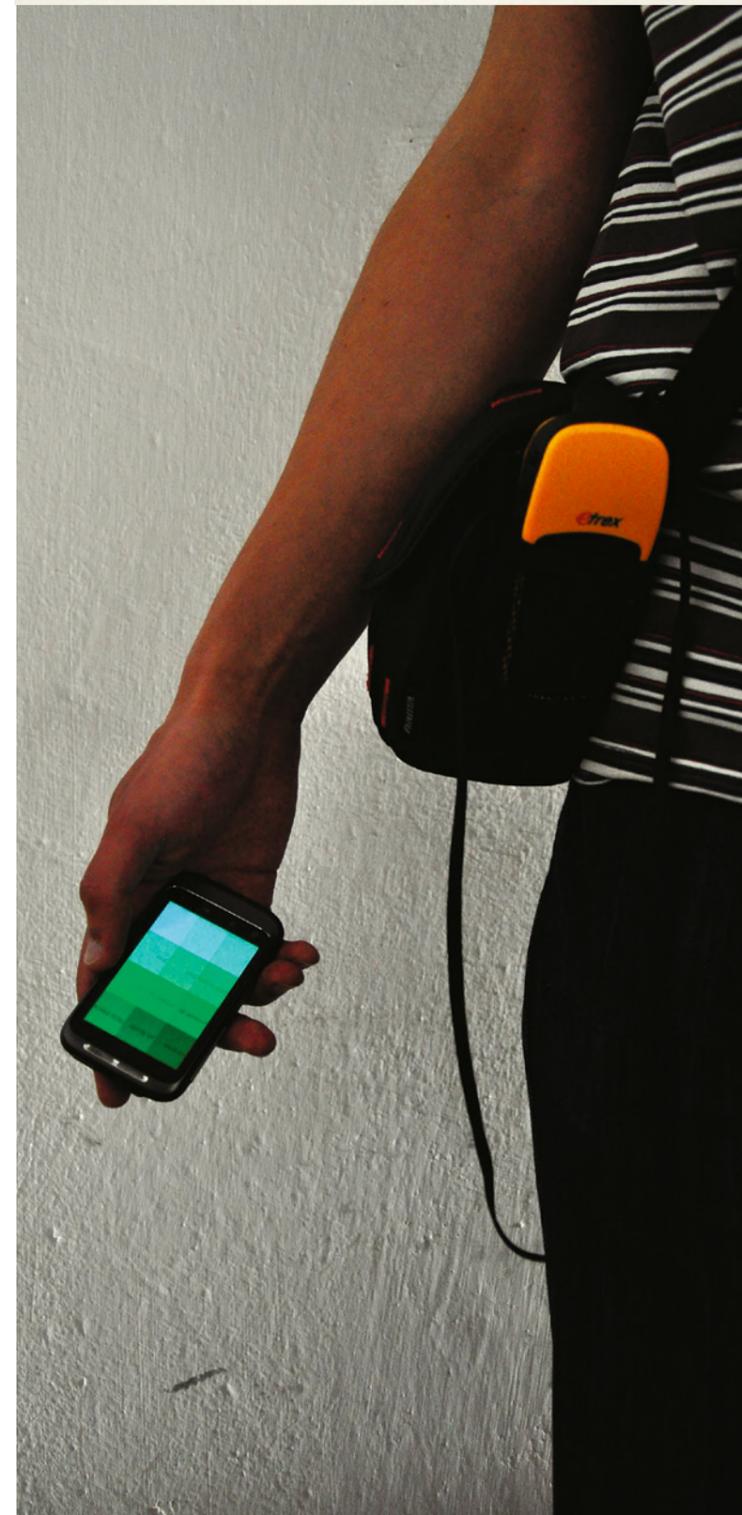
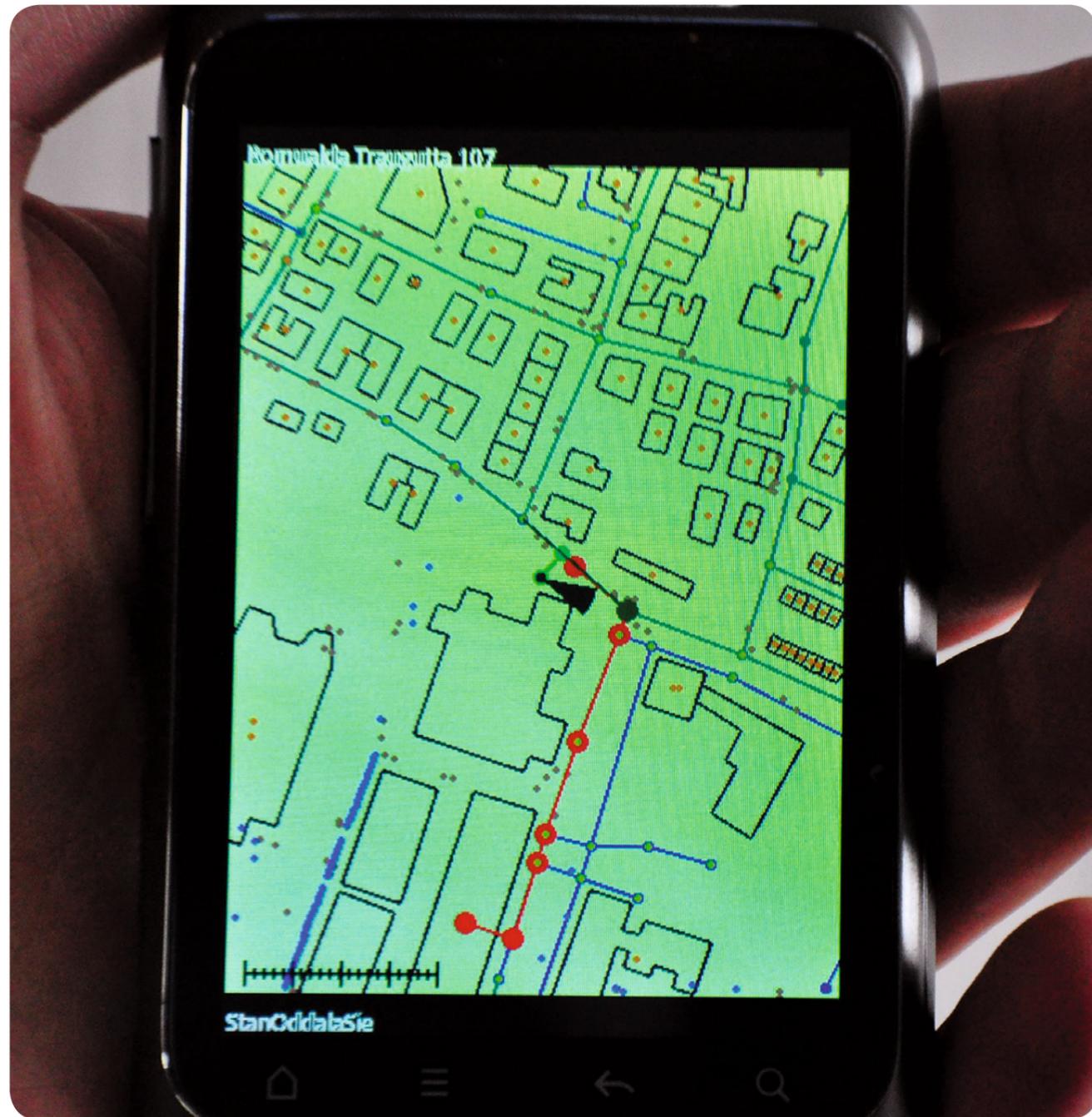
Support area: InTech undertaking



R&D project is co-financed from the IniTech initiative established by the Minister of Science and Higher Education in 2009 in order to support innovative scientific research.

The purpose of the "Talking Maps – the GIS system supporting the blind people in moving in urban areas" project is to develop the innovative comprehensive solution that would facilitate the process of walking throughout Polish cities for blind persons. The scientists focused on development of appropriate methodology of collecting and processing the data on routes for pedestrians and other objects in the area and on constructing prototypes and conducting the test of the system in the selected area.

There is a chance that the system will become operational in a year. The OPEGIEKA company is already preparing the system implementation. Moreover, the offer for companies can be found in international technological offers databases thanks to the Centre For Knowledge and Entrepreneurship of the Gdańsk University of Technology. First contacts with interested companies from France and Hungary have already been started.



The interview with
Prof. Andrzej
Stepnowski
of the Gdańsk University
of Technology

What distinguishes the "Talking Maps" system from the typical GPS, that can also show us which way we should move?

The first thing is that "Talking Maps" consider spatial data much more complicated than those regarding only information on streets. They provide users with a greater level of accuracy. In comparison to typical GPS devices, the way of leading a blind person along the path is more complex. "Talking Maps" use graph theory algorithms not only to search for a path, but they make it in a much more precise way, considering the fact that the blind person cannot compare the received information to reality. Moreover, our system provides access to a special multimodal user interface dedicated to blind persons.

Co What device is going to serve for users as a receiver?

We use a GPS receiver built-in to a smartphone and an external, much more precise DGPS device.

How do Talking Maps work?

The application is installed on a smartphone. Users use the touchscreen, which we customized to their needs by means of many applied solutions. The application produces messages by means of a speech synthesizer. Using location data downloaded from the GPS receiver and spatial data stored in device memory, the application can clearly identify the location of a blind user and consequently lead them to a selected place, describe their surroundings, and generate warnings on possible dangers.

How detailed such a Talking Map must be?

The system operates within a detailed map and a general map. The latter is downloaded from the OpenStreetMap application, and detailed data are obtained self-reliantly, considering the needs of blind people. Obviously, only using detailed data allows for full employment of all systems capabilities.

What generates the greatest problems?

The greatest problem is to efficiently collect significant amounts of detailed spatial data. The crucial thing is also a further increase in location setting accuracy, because that one currently obtained in an urban area, even by means of a very precise DGPS device, is not completely accurate because of GPS multipath and other errors.

How would you describe co-operation with the blind people community?

During the project, the research was constantly advised by two representatives (consultants) of the blind people community. They supported us on each stage of research, starting with developing system requirements up to the tests of the prototype.

Polish blades for Jumbo-jet

Innovative Polish product used in the newest passenger airplanes manufactured by the American Boeing? Even recently, no one would expect it. However, the blades manufactured in Bielsko-Biala will be used in the GenX-2B engine.

It is a state of the art engine recently developed by the American corporation GE Aviation together with its partners, for the needs of the newest Boeing airplanes. It is characterized with 15% lower consumption of fuel and noise reduction by even 30% in relation to the presently used structures. It ensures more economical and comfortable travelling.

However, the Avio Polska Sp. z o.o. company from Bielsko-Biala, belonging to Avio, an Italian industrial group from the aviation sector, is not only a manufacturer of these blades. The engineers from the company are also their creators. The participation of engineers from Bielsko-Biala in constructing the state of the art engine for large passenger airplanes is an event without prece-

Project title: Development and launching of production of parts of a fixed low pressure turbine for a turbofan aviation jet engine Genx-2B

Beneficiary: AVIO Polska Sp. z o.o.

Project value: 4 594 215 PLN

Implementation period: May 2007 – November 2009

Support area: Technological Initiative



Metallographic laboratory.



6th stage of low pressure turbine.

dence in the history of our aviation industry.

The Polish scientists created the blades within the framework of the research programme „Development and launching production of stable part of low pressure turbine for turbofan airplane engine GenX-2B”. The programme was financed by the Technological Initiative undertaking.

Investment of these resources was an extreme success. Avio Polska won a good source of income and increased employment. The country won high quality export product in the aviation branch, which belongs to the most modern and innovative branches in the world.

This success changes the perception of our products. For a long time the media complained that the Polish export contains mainly semi-finished products and our biggest advantage is cheap workforce ensuring attractive prices to Polish products. These complaints used europallets as a symbol – wooden structures made of crappy boards, used for transport of goods.

The engineers from Avio Polska proved that our advantages may also feature innovative technical ideas and very high quality.



Details of low pressure turbine.



Passion = aviation.



Interview with
Łukasz Komendera,
technology research and
development manager
at Avio Polska Sp. z o.o.

What were the beginnings of creating elements of modern engine for American company in Bielsko-Biala?

In 2006, when the design works on GenX-2B engine started, our parent company decided that the team of designers from Bielsko-Biala will be included in the project. Our construction department constituted the core of the entire group, which worked on this project and participated in the works since the very beginning. The Avio company participated in the entire project as the partner of GE Aviation responsible for creating low pressure turbine.

What conditions must be met by your blades?

They are mainly exposed to high temperature. They form the part of engine which is exposed to gases generated during consumption of the fuel in the engine. The blades must endure large loads in high temperatures of about 700 – 900 °C. The engine is also exposed to significant impact of high temperature corrosion, so the blades are covered with special aluminum coatings.

What is the share of Avio from Bielsko-Biala in manufacturing of the blades?

Presently, we are the only supplier in the world. The entire production cycle – starting from casting from nickel superalloy, through coating and finishing with special processes – is conducted in Bielsko-Biala. It is a modern, fully automated production process and all machines are extremely advanced. From Bielsko-Biala the blades are sent to Japan, where they are assembled in the engines as finished products.

Which airplanes use engines with Polish blades?

GenX-2b is used in the newest version of Jumbo Jet, that is Boeing 747-8. A few such machines are already in commercial operation.

What were the benefits of subsidy?

The possibility of obtaining the subsidy for researches was a very important factor affecting the process of decision-making. It was also very important that we received a subsidy from PARP for launching of the production line.

How long are you going to manufacture the blades?

An aircraft engine usually operates for 20-25 years and new engines are not designed every year. These structures are supposed to work for 20-30 years. So we will manufacture these elements at least for the next 15 years.

Did the creation of blades affect your opportunities to obtain other orders?

The successful project affected the decisions made in our headquarters and presently it is possible that other large, innovative investments will be located in Bielsko-Biala. Undoubtedly, it is also influenced by the possibility of obtaining subsidies from government agencies for launching production of innovative products.

Health

Many people say that health is our most precious treasure. Illness may significantly diminish the standard of life and sometimes even take it away. Therefore, it is very important to continuously improve our abilities of detecting and fighting diseases.

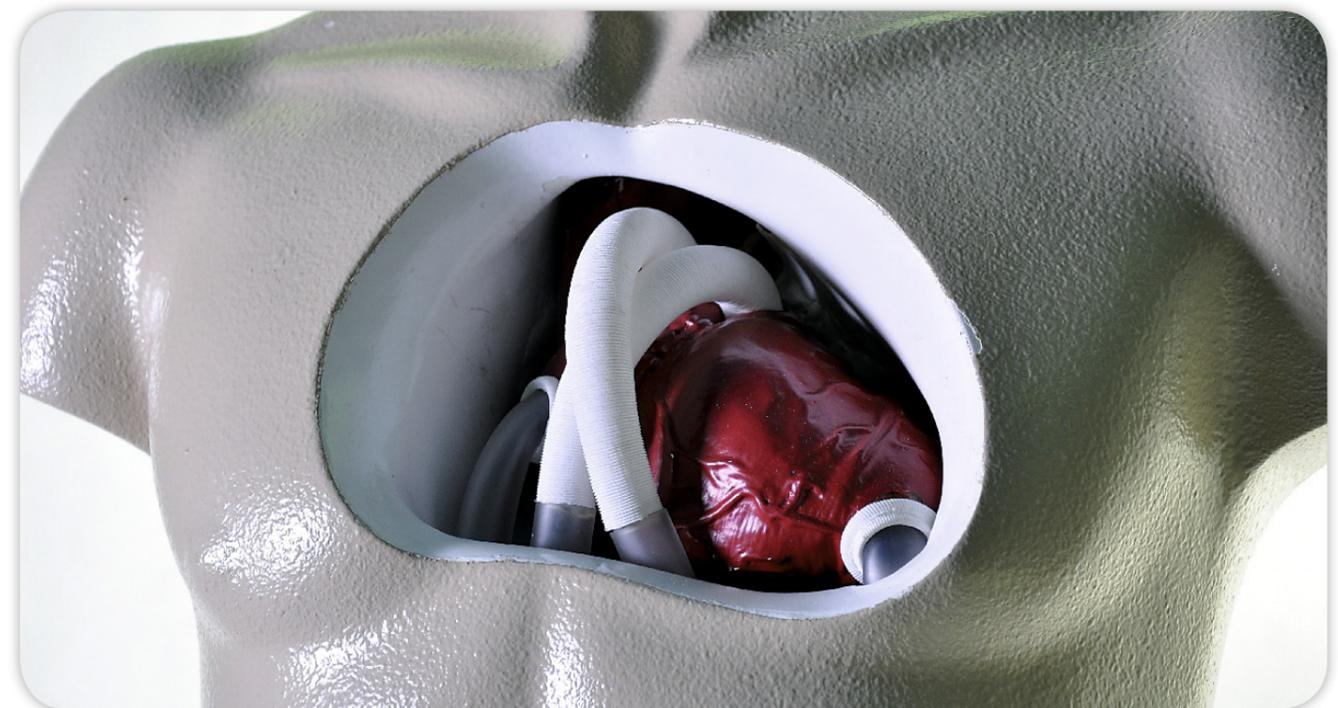
NCRD initiates numerous researches connected with development of medicine. The majority of Poles will easily recognize the Polish Artificial Heart programme, continuing the research started many years ago by professor Zbigniew Religa. This project is one of flagships of our innovativeness in the domain of medicine. Heart supporting prostheses created within the framework of this project are among the world's best.

NCRD also finances research in the international competition concerning application of nanotechnology in medicine within the framework of ERA-NET (EuroNanoMed). This is one of innovations in the health domain that is connected with the largest hopes for modernization of treatment methods. The Centre participates also in the international ERA-NET NEURON programme connected with neurobiology research.

NCRD participates in the international AAL programme, which is aimed at improving independence, mobility and self-confidence of elderly people by means of adjusting the existing technologies to their needs. Increased independence and mobility significantly affect psychological condition of elderly people, allowing them to maintain health and good shape for a long time.

Because of the actions taken by NCRD in 2011, in the future there will be more projects connected with innovations in medicine. While implementing the instructions of the National Research Programme, the Centre Council started extensive works on the strategic programme connected with civilization diseases, new drugs and regeneration medicine, including such domains as: cardiology, neurology and senses, oncology and regeneration medicine. Strategic programmes are the most important tool of the Centre. The programme launch is planned for the second half of 2012.

Intensification of research will also be affected by works on the cooperation agreement with the Polish Technological Platform of Innovative Medicine, started in 2011. The Platform associates Polish companies investing in research on new drugs, medical technologies and equipment.



The heart made of titanium

In the eighties of the last century the team of specialists working close with late Prof. Zbigniew Religa began works on construction of the Polish artificial heart. In those times it was a really courageous dream. First such a heart was planted in 1982 in the USA, developed by Dr Robert Jarvik.

After many years of work Polish specialists gathered in the Foundation of Cardiac Surgery Development established in Zabrze in 1991 created a heart supporting extracorporeal prosthesis, which drive is so large that it is located in quite a big cabinet. Over 250 patients took advantage of its assistance.

Thanks to the Polish Artificial Heart Multiyear Programme, established by the Polish government in 2008, the next very productive stage of work began.

Although the name of the programme suggests its goal is to develop an artificial heart, the experts have in fact focused on developing the devices that support heart's activity and not replace it. They made such a decision in order to have the most effi-

Project title: Development of clinical structures for heart support systems

Beneficiary: Professor Zbigniew Religa Foundation for Cardiac Surgery Development

Project value: 6 681 600 PLN

Implementation period: August 2008 – December 2012

Support area: Polish Artificial Heart Long-Term Programme



A prototype of an extracorporeal pulsatile blood pump Religa Heart EXT.



A prototype of a mobile control panel for pulsatile blood pumps Religa Heart PDU 402.

cient use of programme funds as such devices are most requested by clinics as up to 97% of the cases of heart prostheses use is connected with supporting activities. Development in technology and in heart failure treatment resulted in planting prostheses by surgeons not just to support a dying heart, but to heal it, when it can be still rescued.

In slightly over than 4 years the specialists from Zabrze developed the original, advanced devices that constituted a kind of typical Polish type of heart prostheses.

Thanks to this program the new version of a supporting extracorporeal heart chamber was developed as well as its plantable version which is going to be something really revolutionary in the future along with development of living cells technology. Apart from these devices, the specialists from Zabrze develop two small rotodynamic pump (centrifugal and axis), plantable to the patient's heart that could support it for the period from several months up to several years and would possibly become permanent prostheses in the future



A prototype of a partially implanted centrifugal blood pump of the 3rd generation Religa Heart R0T.



A prototype of a partially implanted pulsatile blood pump Religa Heart IMPL.



A prototype of a mobile control panel for pneumatic heart prostheses Religa Heart PDU 501.



The interview with Eng. Roman Kustos,
Director of the Artificial Heart Laboratory

How do Polish research succeed in comparison to other countries, are we in the top?

The research on heart prostheses in Poland started 20-25 years after first such research was conducted throughout the world. Americans had been working for almost 20 years before they planted Jarvik's heart. Nowadays, Polish air-operated heart supporting chambers are one of just five types that medicine uses all over the world. There are two American types and one from Germany and Japan each. Moreover, our newest prosthesis is going to be much more innovative. We developed solutions that decrease the risk level of its usage and some other advantages those types of prostheses do not have. Among them there is capability to support treated heart synchronously with its work that gives better conditions for heart's recovery. Thus thanks to this program we definitely came closer to the top countries in last four years, especially when it comes to heart prostheses development. We are not so successful considering their application.

What are you working on at the moment?

Along with other programme's participants we are conducting varied research. In this very year we plan to finish development of prototypes of both rotodynamic pumps (with rotors attached without bearings, levitating in a magnetic field). At the moment there are only three such prosthesis projects in the world. We have also developed the system for prosthesis work remote monitoring. Until now such a system has not been implemented by anyone, but research is conducted by other laboratories.

What advantages do the prostheses developed in 2008 bring?

New generation of prostheses allow the patients to leave a hospital for some time. They could stay at homes as ambulatory treatment will be sufficient enough and thus treatment will be cheaper and more comfortable for them. Moreover, greater amount of prostheses could be used as, thanks to letting patients go home, the problem of long-lasting hospital treatment will disappear.

You have intentionally left the idea of developing a complete artificial heart at the moment. Has anyone in the world been using such devices at all?

At the moment there is only one such a prosthesis in the world. It is SynCardia, the improved version of Jarvik's project. There was another complete artificial heart, fully plantable in the USA, however after its highlighted introduction its usage was suspended and it is being enhanced at the moment. French specialists are also working on such a project, which we have a partner status in.

New technologies for the seniors

In the modern times, the elderly have to face various challenges. Fast development of technology leaves them behind the fast-changing environment. Use of technologies and devices, which are designed mostly for young people, is often very difficult for the seniors.

On the other hand, new technologies offer the elderly a great chance to improve the quality of their life and to remain active until very late age.

Therefore, 20 states of the European Union (including Poland) and 3 countries not belonging to the Community have come up with the Ambient Assisted Living (AAL) initiative. Its objective is to engage in research and development works, aimed at improvement of the quality of life of the elderly by adapting the existing information and communication technologies to their needs. The initiative is co-financed by member states (25 percent of the funds), the European Commission (25 percent) and the private sector (50 percent).

The aim of the AAL programme is to make young people more independent, self-assured and mobile. It is also aimed at preserving health and facilitating care of these persons, both for their families and for specialized organizations.

Project title: Going my line: my social Life (Go-myLife)

Beneficiary: Knowledge Society Association

Project value: 2 400 000 EUR

Implementation period: July 2010 – December 2012

Support area: Ambient Assisted Living Joint Programme, ICT based solutions for Advanced of Social Interaction of Elderly People



Another crucial objective is to stimulate the effectiveness and productivity of the elderly, which will be of key importance in the future in the quickly ageing societies of our continent.

One of the projects implemented within the framework of this initiative is Go-myLife. It is being carried out by an international consortium, made of companies, research institutions and NGOs from Poland, Greece, Great Britain, Spain and Austria. The Polish participant of the Consortium is the Knowledge Society Association – a non-profit organization aimed at implementation of projects in the field of information society, putting particular emphasis on counteracting digital exclusion.

The aim of the Go-myLife project is to create applications and a platform that would facilitate access to community networks using modern equipment.



Interview with
Artur Kolesiński,
president of the
Knowledge Society
Association

How can community networks be helpful to seniors?

The main problem, faced by the elderly, is social isolation. Community media allow people to engage in new relationships and maintain them, share our passions with others, find new hobbies. This allows the seniors to counteract social isolation and become more active. As a result, we reduce social exclusion, we increase the productivity of the elderly, we make it easier for them to attain the skills that are needed on the labor market and we make them more independent for much longer.

What is Go-myLife?

This is a sort of a new community medium for persons aged 55 and above; however, we expect it will be strongly integrated with the existing portals of this type, such as Facebook. Our platform can be accessed by cellular phones, like Smartphone, computers and tablets.

How much have you been able to do so far?

Since December until mid-February of this year, we were engaged in a pilot implementation of the application to see whether it would be interesting for the senior, whether they would encounter any barriers associated with use of the devices and software and whether they would be willing to contact other people and exchange information in this manner. At present, our engineers are preparing an improved version of the application, which is to be tested during the vacation period.

What problems do we have to overcome to encourage seniors to use the community media?

Our test group consisted of almost 20 persons aged 60 or more, several of them were 50 to 60 years of age. Those are both people, who have used computers before, and those, for whom this was the first or nearly the first encounter with these devices. Therefore, it was necessary to get them familiar with the devices, the Internet and the community media concept. The greatest challenge was associated with communicating of the project objectives, overcoming of the mental and psychological barrier and introducing the elderly to the world of new technologies and communication means. We are most eager to learn from our contemporaries – learning seems to be easy then. The psychological barrier was overcome, since the tests were conducted by persons aged 50-60 or more. They showed the participants that “nothing could be broken here”, and whatever seemed impossible turned out to be easy to do.

What are the test results?

Our experiences so far are positive. The seniors responded positively to the idea, they were very curious of other people, they integrated with the group, they exchanged pictures and opinions, using the platform. Moreover, they provided us with many valuable comments and suggestions.



Energy and ecology

In 18th century the first steam machines were invented – it was the start of the industrial revolution that entirely changed the quality of life of all people. Since that time, we have been inventing modern machines, which use huge amounts of electric power. The results are good for us – the standard of life increased so much that even poor people have better conditions nowadays than the richest aristocrats of the pre-industrial era had at their time.

However, we pay a high price for this progress. According to the majority of climatologists, we have emitted so much carbon dioxide and other greenhouse gases to the atmosphere, that we started the global warming effect, which may lead to climate changes and catastrophic weather anomalies.

We have to seriously consider the impact of our inventions on the climate and stop the damage that we are causing. The problem is that there few people are ready to lower their standard of living to save the environment. Therefore, we need technologies that will allow us to use the benefits of industrial revolution and at the same time will be more friendly towards the environment.

NCRD supervises also the strategic research programme „Advanced technologies of generating energy“. It includes four research tasks concerning clean coal technologies, generation of fuels and energy from biomass. This is one of the most important Polish research programmes with budget of about PLN 300 million. It will provide us with the possibility to generate energy and fuels using methods that are much more friendly to the environment.

Another solution to the same problem is the strategic research project entitled „Integrated system decreasing operating energy consumption of buildings“. In this case, the objective is to decrease the amount of energy required to heat and light our houses and other buildings. Another strategic project – „Technologies supporting development of safe nuclear energy sources“ is aimed at preparing the way to introduce nuclear energy sources in Poland. Although they cause anxiety of a part of the society, such sources are good for the climate because they do not emit greenhouse gases.



Gas from coal

For many decades, coal has been one of the most valuable resources of Poland. It is used for production of most electric and heat energy, consumed by Polish houses and companies. However, the present times are very bad for the „black gold”, as coal is called. The need to counteract global warming has forced the European states to drastically limit the emission of greenhouse gases, particularly carbon dioxide (CO₂). Combustion of coal results in releasing of great quantities of this gas. Soon, companies will have to pay for its excessive emission, which may lead, among other things, to a dramatic increase in energy prices.

Therefore, a need for the so-called pure coal technologies has arisen, which allow for use of coal in a more environment-friendly manner. One of such technologies is coal gasification. Its ecological significance is based on the fact that gas combustion is much less harmful to the environment.

The consortium of Polish companies and institutions, led by the St. Staszic Academy of Mining and Metallurgy, has launched works on the project for “technology of coal gasification for highly effective production of fuel and power”. The consortium

Project title: Development of coal gasification technology for highly effective production of fuels and electrical energy

Beneficiary: AGH University of Science and Technology

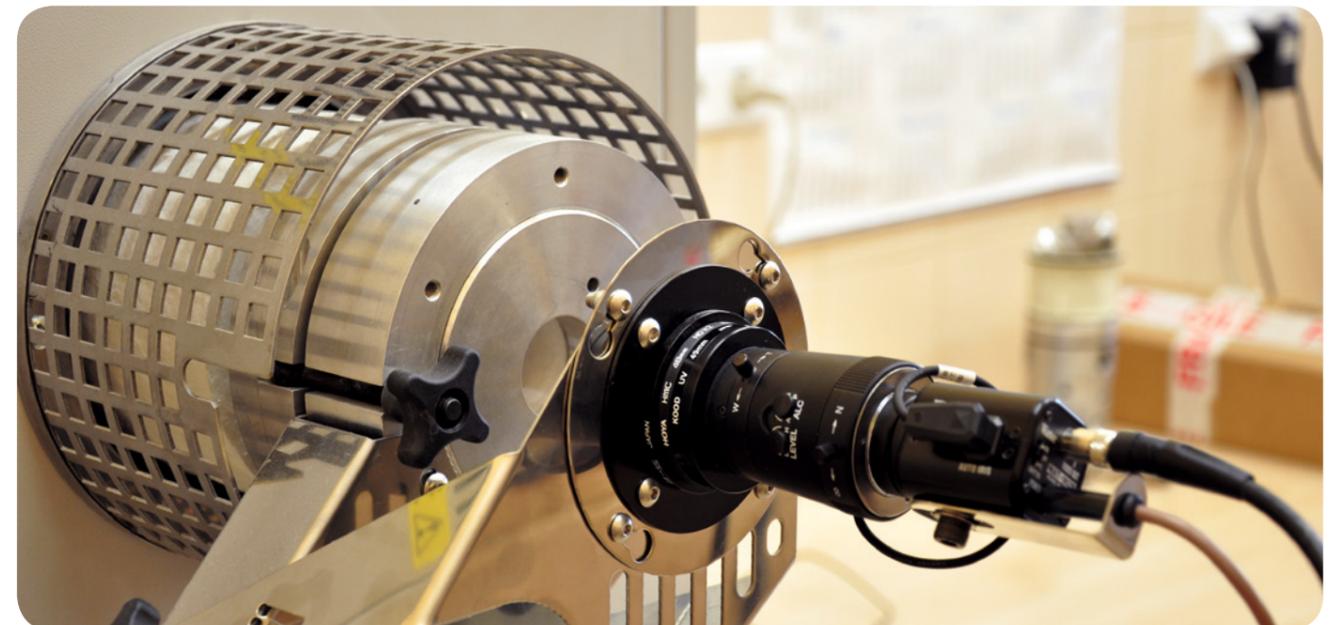
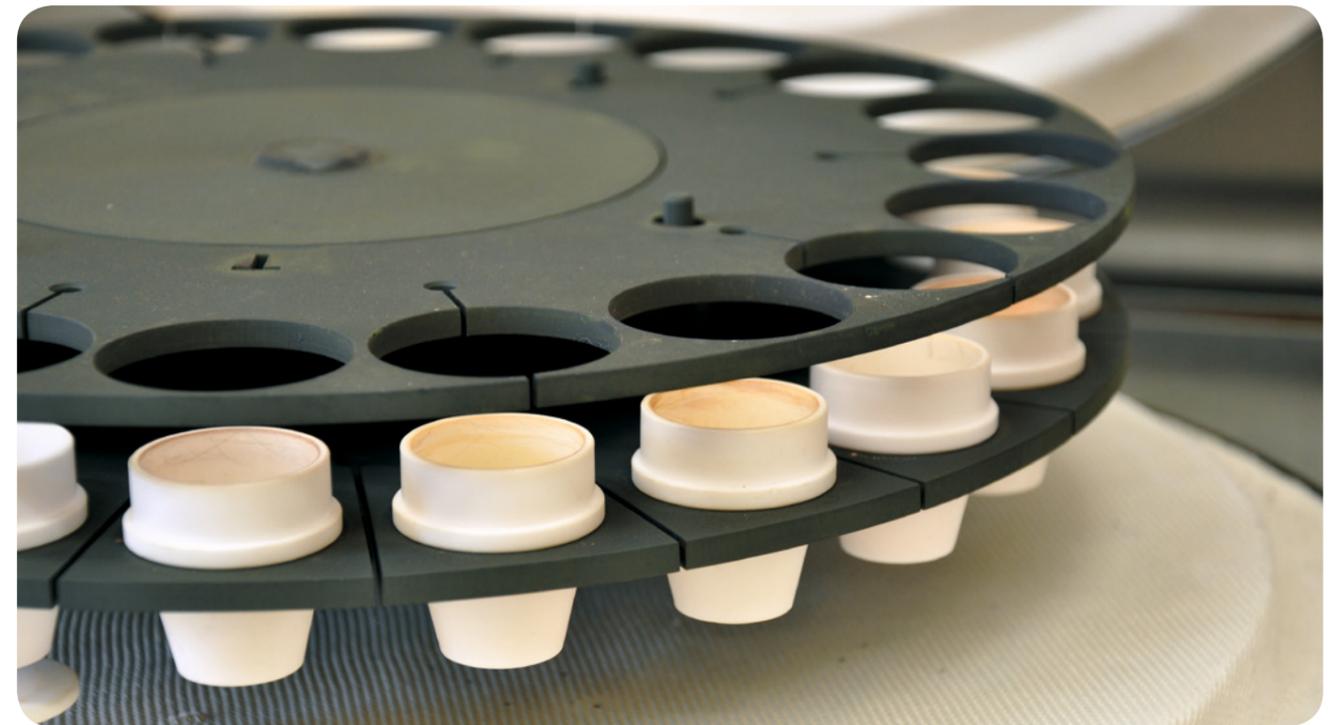
Project value: 80 000 000 PLN

Implementation period: May 2010 – May 2015

Support area: Strategic research programme: „Advanced energy production technologies”



Laboratory installation for coal gasification and pyrolysis.



Analyzer for characteristic ash fusibility temperatures.

consists of three research institutions: the Main Institute of Mining in Katowice, the Institute of Chemical Coal Processing in Zabrze and the Silesian University of Technology in Gliwice, as well as mining companies (KHW, KGHM, PKW), power operators (TAURON-Polska Energia i TAURON – Wytwarzanie) and chemical companies (ZAK). The project is to provide new solutions not only for production of power and heat from hard and brown coal, but also provide the chemical industry with a new source of gas. Research is directed both towards above-ground gasification of already excavated coal and underground gasification of coal deposits.

In the opinion of the Polish researchers, the proposed gasification technologies, in particular, coal gasification under pressure in a fluidal reactor using CO₂ as the gasification agent, will allow for reduction of emission of greenhouse gases and thus they will exert a positive impact on the price of power and heat produced.



CHS elementary analyzer.



Atomic Absorption Spectrometer Z-2000 Hitachi.



Interview with professor Andrzej Strugała,
of the Academy of Mining and Metallurgy
– the project manager

What are the potential advantages of coal gasification?

Our commitments with regard to greenhouse gas emission reduction, in particular with regard to CO₂, require a radical change in the technologies of energy production used. Lack of such changes will result, in practice, in limiting of the role of coal, and thus a serious worsening of the level of energy security of Poland. The coal gasification technologies should thus be treated as an opportunity to base our security on own resources – hard coal and brown coal – in the future. Thanks to substantial resources of these resources, our country is today in the lead with regard to energy security. Only in the case of hydrocarbons, in particular, natural gas, the situation is not advantageous. Coal gasification could lead to improvements thanks to replacement of natural gas, which is not available in sufficient quantities in Poland, with synthetic gas produced from coal, which will reduce our dependence on external suppliers.

What has been done so far in the project?

The works conducted so far with regard to above-ground coal gasification will be concluded by launching at IChPW Zabrze in the second half of year 2012 of a pilot coal gasification reactor, operating under pressure. In 2013, we will launch another reactor for underground gasification of hard coal, including the underground and above-ground infrastructure necessary for its functioning. The reactor is being constructed on the basis of a project prepared by GIG Katowice with participation of KWH. Within the framework of the project, a complex analysis of the domestic resource base has been conducted for coal gasification processes, and a map of technological solutions has been prepared.

How is coal gasification going in other countries, has it been implemented as a mass (industrial) process anywhere, or is it still at the stage of experiments?

The process of coal gasification is not a technical novelty. It had been conducted, for instance, at the local gas companies in today's Poland in the mid-19th century. Germany used coal gasification during the second world war, when it had no access to crude oil. At present, the coal gasification process plays an important role in the Republic of South Africa, and the technology is developing most dynamically in China.

Will the technologies proposed, particularly underground gasification, be able to replace miners?

Miners should not fear for their workplaces. Quite contrarily, implementation of the new, so-called pure coal technologies will surely strengthen the position of coal in relation to competitive energy sources, such as natural gas or nuclear power.

Cheaper heating

An average Polish family spends about 10-12% of its budget for various energy bills. In other countries of the European Union, characterized by similar climate conditions (e.g. in Denmark), this value amounts to about 4.5%. A significant reason for this difference is the fact that for many decades, buildings were constructed in Poland without taking into account their energy efficiency, or – putting matters more simply – their ability to prevent heat losses. It escapes our homes, among other things, because of the walls being too thin, poorly designed and constructed windows and roofs, as well as insufficiently insulated joints between structural components.

Excessive energy consumption by buildings results in wasting of huge amounts of coal and gas. This constitutes not only a financial problem, but also damages to the ten environment (e.g. due to increased emission of greenhouse gases and dust).

In order to limit these substantial costs, a strategic research project has been initiated, known as the “Integrated system for reduction of operating energy consumption of buildings”, which has been implemented since 2010. Its objective is to devise the technical and organizational solutions in terms of design, construction and operation of buildings, which will reduce energy consumption and increase the use of renewable energy sources.

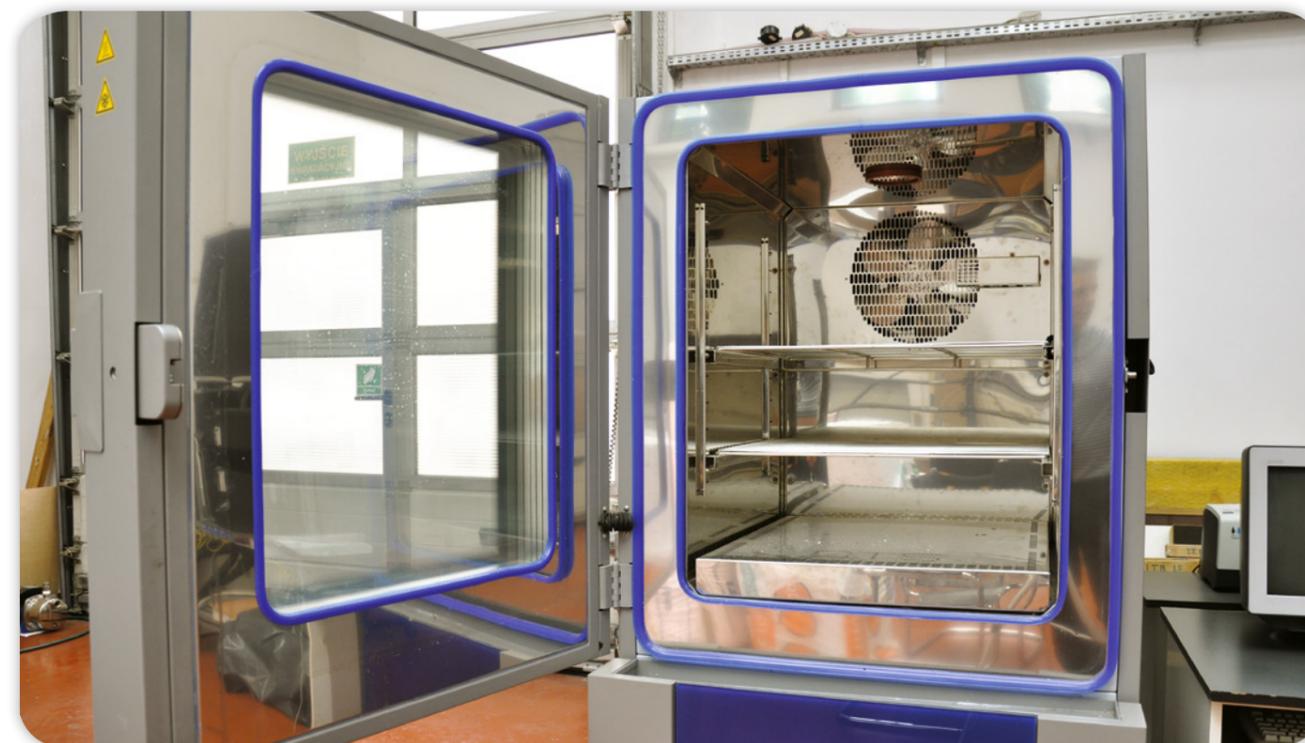
Project title: Development of optimum energy-efficient structural and material solutions and installations for buildings

Beneficiary: Institute for Building Technology in Warsaw

Project value: 4 409 160 PLN

Implementation period: May 2010 – May 2013

Support area: Strategic research project: „Integrated system to reduce operational energy consumption in buildings”



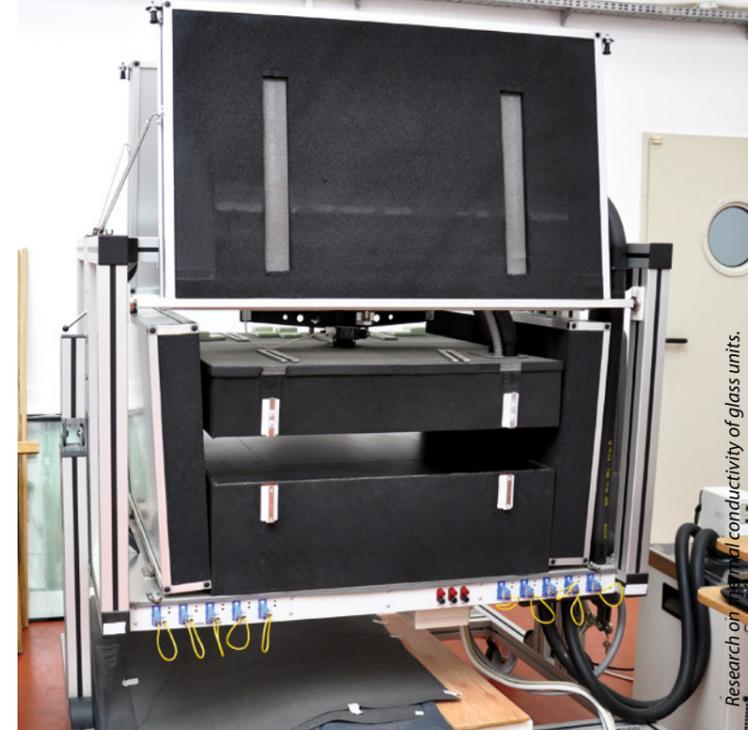
A climatic chamber to conduct research on thermal insulations.

Within the framework of the project, 7 research tasks are being implemented by scientists and specialists representing many Polish universities and institutes. The researchers will examine the profitability of use of new, energy-efficient materials and solutions, they will prepare recommendations and guidelines for creation of structural, material and installation solutions with optimum energy-saving characteristics.

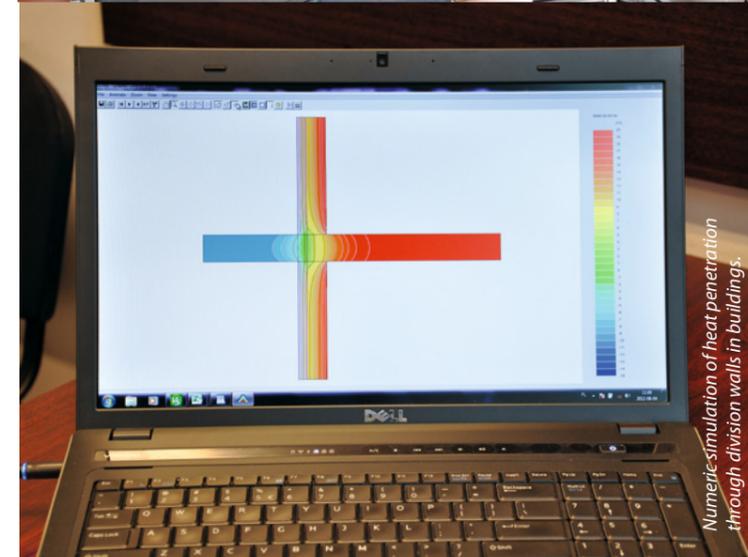
One of the tasks – “Devising of energy-optimum typical structural, material and installation solutions for buildings” – is being implemented by a consortium led by the Institute of Building Technology in Warsaw.



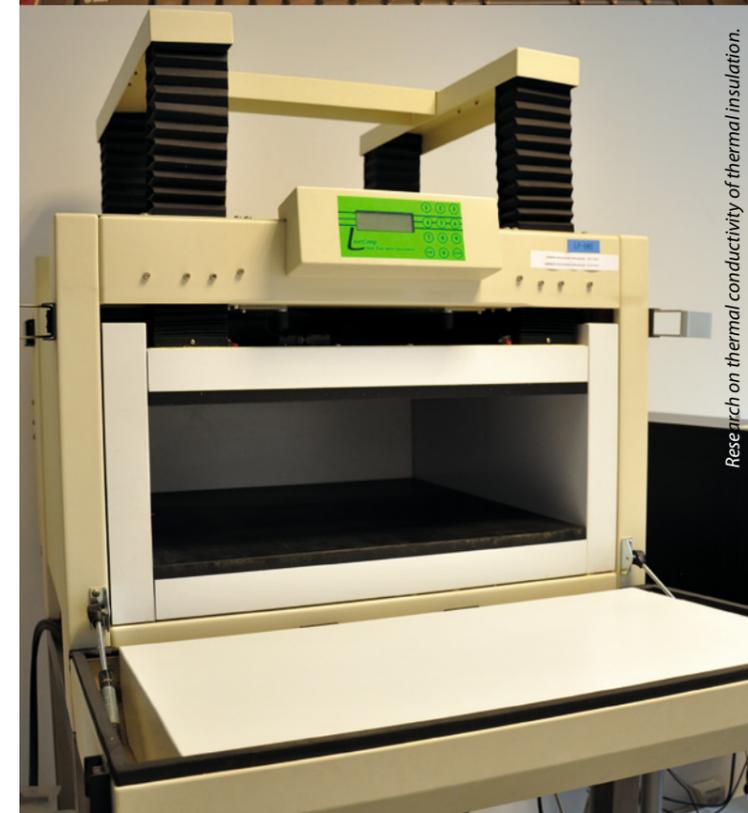
Workstation for testing flow in ventilation installations.



Research on thermal conductivity of glass units.



Numeric simulation of heat penetration through division walls in buildings.



Research on thermal conductivity of thermal insulation.



An interview with Professor Stanisław Mańkowski of the Institute of Building Technology

How can ordinary people gain from introduction of energy-saving solution?

Most of all, a significant reduction of costs associated with heating, hot water supply and ventilation. In Poland, about 40% of primary energy is consumed for heating. Reduction of this value in the period of 10 to 15 years to the level of 20-25%, that is, almost by a half, will improve the economic condition of Poland, which will be noticeable both at the national and individual scale. Reduced energy consumption by buildings will also allow for use of the energy saved, for instance, for production purposes.

Another advantage is improvement of the condition of the urban environment due to liquidation of the so-called “low emitters” (such as house-mounted furnaces for heating) or introduced of combined production of heat and power. Reduction in consumption of energy will also improve our energy security, which is of utmost importance for countries characterized by geographic location similar to Poland. For the next generations, it will also be very important to slow down consumption of fossil fuels and replacing them with renewable energy, such as biofuels or wind energy or solar radiation.

Can the solutions devised be used only in new or also in existing buildings?

We are proposing solutions both for existing and new buildings. In existing buildings, energy consumption can be reduced through the so-called thermomodernization projects, which reduce energy consumption and thus the operating costs even by 30-50%. In new buildings – the so-called low-energy or passive buildings – heat supply will be reduced by more than 10 times in comparison with the traditional solutions, such as the pre-fabricated pre-stressed concrete buildings constructed in the 60s and the 70s of the 20th century.

One of the objectives of your research task is to eliminate solutions, which result in excessive energy consumption. Have you identified such solutions? Which of these are the ones that generate most losses?

Yes, facilities constructed according to technologies, which generate excessive energy consumptions, have been specified precisely. These include the pre-fabricated pre-stressed concrete buildings, already mentioned here, even after their thermomodernization (performed in the initial stage in years 1980-1985). Another very problematic category are buildings of the area too big in relation to their volume, which is usually due to implementation of a design concept, which did not take into account the energy effects of the project.

Safety

Feeling safe is one of the most important elements affecting the quality of our life. However, there are many potential threats.

Every day we encounter many dangers, for example at work, on the streets, in the means of transport or during mass events. Other dangers are much less common, but they may have unexpected results, as for example terrorist attacks. Furthermore a country should also take care of external safety, which requires a modern army.

Within the scope of research concerning safety and defence NCRD agreed, in cooperation with the Minister of National Defence and the Minister of Internal Affairs, the priority areas for conducting scientific research and development works. As a result, together with the both ministries the assumptions for six strategic programmes were agreed. These programmes will be carried out in the nearest future.

Furthermore, in 2011 the competition No. 1/2011 was announced with respect to performance of projects from the area of scientific research and development works for safety and defence of the country. Their realization will allow, among others, to improve training of fire brigades, create modern fire monitoring systems all around the country and improve fire protection in new buildings. Many projects are devoted to modernization of criminalistic techniques. The Stalowa Wola Steelworks obtained funds for further works on 155 mm self-propelled auto-loading guns, which is one of the largest undertakings of the Polish armament industry.

Only in 2011, the total spending of the Centre on all projects on the domain of defence and safety amounted to PLN 417 million.

Another area considered by the Centre is safety at work. NCRD supervises, among others, the long-term programme entitled „Improvement of work conditions and safety”. Also, the strategic project „Improvement of work safety in mines” focuses on preventing a specific problem – the threat of methane explosions in mines.



Safer mines

Underground mining has always been considered as one of the most risky jobs. Various dangers lurk for miners in systems of corridors that are many kilometers long. The greatest of those dangers is methane, locked in the ground in the coal beds. It is responsible for most fires and explosions in mines throughout the world.

Methane has taken its toll on Polish miners many times. The last great tragedy happened in September 2009 in the "Wujek"- "Ruch Śląsk" mine in the city of Ruda Śląska, when the methane explosion killed as many as 20 miners 1050 meters below the ground level. Just three years earlier methane killed 23 miners in the „Halemba” mine, situated in the same city.

In order to prevent such situations to happen it was decided to commence the research project entitled "Improving of safety work in mines". Assumptions of the project were developed on the basis of recommendations of the commission investigating reasons and circumstances of mine accidents between 2000 and 2010. The project consists of 8 research tasks and several Polish institutions and universities are engaged in their performance.

Project title: Development of rules for designing of mining works under the conditions of combined methane and fire threat in the aspect of ventilation systems in underground hard coal mining plants

Beneficiary: Central Mining Institute in Katowice

Project value: 2 160 000 PLN

Implementation period: October 2011 – September 2013

Support area: Strategic research project: „Improvement of work safety at mines”



All pictures: gravitational- metric and absorbent system IGA.



The specialists working on the project are tasked to develop organizational and technical solutions that will lower the level of dangers connected with methane. Technical solutions include among others development of wireless communications system for mining rescuers and improvement of measuring devices monitoring the ventilation, methane and fire risks.

Many of the project's tasks are conducted by the Central Mining Institute in Katowice (CMI). Among these tasks there is „Development of the mining works designing rules in the situation of combined danger of methane ignition in context of airing systems in underground mining facilities extracting bituminous coal” that is supervised by Prof. Eugeniusz Krause.

Its goal is to develop general guides for persons designing bed exploitation. These guides, concerning for example airing systems, estimating criteria of coal extracting from walls or on excavations sections, shall identify the safest solutions considering the increasing threat connected with methane.



Interview with Prof. Eugeniusz Krause of CMI

Methane explosion threat in Silesian mines has increased in recent years. Why has it happened?

We can identify three main factors that resulted in significant decrease of the security level in last 15 years. The first is linked to the necessity of coal extraction from excavations that are situated increasingly lower. The average underground level of coal extraction is increased by 8 meters every year. However, together with the depth, also the concentration of this dangerous gas in the air is increased. At the depth between 950 m and 1050 m there is the highest concentration of methane. As a result, in the last 15 years the emission of this gas from each excavated ton of coal increased by 5 m³, that is about 60%.

Apart from lowering the level of extraction, the threat was increased because of increased intensity of extraction. In last 15 years, the length of the exploited walls was increased by over 35%, according to market demand. However, the longer the wall is, the most serious problems with methane occur.

And the third factor increasing the methane threat?

There are little funds on mining industry. It is a really significant problem. The expenses have been limited since 1989. The expenses had to be necessarily limited in order to maintain profitability, but on the other hand it had negative impact on investments such as deepening the shafts and main excavations. Limitation of investments forces designing and conducting the so called sublevel excavation. Presently, over 50% of the excavated coal comes from sublevel areas. With such method of excavation, 106 miners were killed in a methane explosion in 2007 in the Zasyadko mine in Donetsk, Ukraine.

Why cannot methane be simply removed before exploitation commences?

It is done for instance in the USA, where methane is removed from the level of surface before mining works begin. American companies that bought out the license for methane searching in Upper Silesia tried to do this in Poland in the 1990s. Much hope was connected with these actions. Then the problem of methane emission from coal beds was as much highlighted as the issue of shale gas is nowadays. However, the attempts of prior removing the gas did not succeed. Coal beds permeability in Poland is much lower than American ones and methane cannot be effectively extracted.

Safety cascade

The city monitoring achieved considerable success, although not all people think positively about the fact that the streets of our cities are observed by numerous cameras. In some cities the crime rate in monitored areas decreased even by over 50%. Cameras are also very useful in observing stadiums or sports and exhibition half full of people. However, monitoring also has its weaknesses.

One of such weak points is that it delivers large amounts of data, which often exceed the capabilities of the services responsible for ensuring safety. In 2010 only in Warsaw there were nearly 6 thousand cameras monitoring the public space, including 3.5 thousand in the city communication vehicles.

The specialists from the Gdańsk University of Technology attempted to create technology facilitating analyzing information delivered by the cameras. The research project „MAYDAY EURO 2012. Supercomputer platform of context analysis of multimedia data streams for identification of specified items or dangerous events” is financed from the European Union funds within the framework of the Operating Programme Innovative Economy.

Project title: MAYDAY EURO 2012” Supercomputer platform for context analysis of multimedia data streams for identification of specified objects or dangerous events

Beneficiary: Gdansk University of Technology

Project value: 16 316 384 PLN

Implementation period: July 2008 – September 2012

Support area: Operational Programme Innovative Economy, Sub-measure 2.3.3 Projects in regard of the development of advanced applications and tele-information services



Foucault pendulum.

The purpose of this technology is to support processing of actual multimedia data received from various sources. The scientists from Gdańsk created the research platform named KASKADA – Cascade (Context Analysis of Data Streams from Cameras for Alarms Defining Application) which is available in Galera supercomputer (but may be also installed elsewhere).

The platform is an intermediate layer integrating the work of supercomputer with specific user applications. Such solution allows performance of a number of tasks. Therefore, apart from the application analyzing monitoring images, the scientists from the Gdańsk University of Technology developed software analyzing endoscopic films and signals disease changes in the patient's body. Another application working with the platform compares digital documents in order to find any similarities (for example to find plagiarism).



Jan Heweliusz Courtyard.



New FT building.



Gdańsk University of Technology – view of the sculpture Allegory of Science.



Casing of Galera Supercomputer.



Interview with profesor Henryk Krawczyk, rector of the Gdańsk University of Technology

How is it possible that the same platform may be used in very different domains?

The applications are focused on various uses but all deal with analyzing streams of data of the same type, such as: video, sound, text, images. Therefore, the supporting operations performed by the platform may be the same, but the algorithms used may be very different.

We selected the applications so that we could test the capabilities of our platform at full scale. The number of various applications that we tested confirms the universal approach, which is a significant innovative achievement. Besides, such solution makes the process of creating the application much easier.

What dangerous events can be recognized by your technology?

Applications monitoring a specific geographical areas May be created using the Kaskada platform. Such application would support and discharge the personnel supervising such areas. However, it should be remembered that the developed algorithms and relevant application cannot take into account all possible situations. Only some typical events may be automatically detected. One of the usually detected simple incidents is entrance into the restricted area, for example a person entering a protected room.

Another such incident is division of objects. It is important for detecting such situations as abandoned luggage. It is necessary to detect a situation, when a single object (person with luggage) is divided into two objects: person and luggage.

We can also detect for example temporary gathering of crowd in a small area, which can cause dangerous situations, for example when a passage (entrance/exit) is blocked during a concert.

Such systems may cause some fears that we are approaching the world described in the „Nineteen Eighty Four” by Orwell. Are such anxieties justified?

The Kaskada platform is an IT tool. The users will decide how to use it. An ordinary hammer may be used for good and bad purposes. It depends on our authorities whether these fears are justified and not on the technology itself.

How did you solve the issue of personal data protection?

We are waiting for the results of GIODO control. However, in our opinion we act pursuant to the generally applicable regulations. The data base does not contain any data of the recorded persons and the identification is only aimed at differentiating the „person” object from other types of objects.

Education and science

Creation and implementation of innovative technologies requires a large number of qualified professionals. It is also necessary to provide them with proper conditions to conduct research and development works. Therefore, NCRD pays a lot of attention to projects connected with modernization of our universities, improving competences of teachers and facilitating learning, with special focus on the specializations that can decide about the future of Poland.

European Union funds from the operating programmes: Innovative Economy, Human Capital, Infrastructure and Environment are very helpful here. They enable development and modernization of many higher schools, modernization of research infrastructure, maintaining high level of teaching and increasing the number of students at faculties considered strategic for sustained development of the Polish economy.

The funds from Operating Programme Infrastructure and Environment allowed, among others, to create a modern scientific and didactic facility Water Centre of the Construction and Environment Engineering of the Warsaw University of Life Sciences, which contains 20 richly equipped laboratories. The Gdańsk University of Technology will be extended by the Nanotechnology Centre with innovative equipment and 35 specialized laboratories used for conducting research works and teaching the students of nanotechnology, material engineering and technical physics faculties. There are many more such investments in Poland.

The funds from the Human Capital programme allowed to increase the number of students by 15% at the faculties the Gdańsk University of Technology considered important for economy, among others, the biotechnology, chemistry or physics faculty. The Śląsk University of Technology created a new specialization „Information technologies in automation and robotics”.

Innovative Economy Programme, in turn, brought Poland a record funds to science. It is nearly PLN 12 billion on research, development of new technologies and modernization of research infrastructure. These funds created in the Institute of Aviation stratospheric unmanned aircraft Phoenix, while the company BRASTER Sp. of o.o. is working on innovative breast cancer detection tester, which now represents up to 26% of all cancers in women.

However, high amounts of national funds are also invested in education and science. They are used for financing, among others, of the projects described on the following pages, such as the LIDER (eng.: LEADER) programme or creation of the SYNAT system.



A virtual library of knowledge

One of many problems faced by students and researchers is reaching of the appropriate publications. Obtaining of articles and studies necessary to write one's master's thesis requires a lot of time and energy, and sometimes money as well. Undoubtedly, many students and scientists have dreamed of getting access to thousands of academic periodicals directly from their room – or at least from the university library. Soon, these dreams may come true.

16 Polish universities and institutions are working together on the strategic research project – Synat, which is aimed at designing of a platform, or a set of IT solutions, which will serve as a basis for creation of a portal offering access to all Polish and foreign scientific publications. The works are directed by ICM (Interdisciplinary Center for Mathematic and Computer Modeling of Warsaw University).

In short, the project is aimed at creation of an enormous virtual catalogue of various knowledge sources – the scientific information portal Infona. The users will be able to reach the publications saved on servers of publishing houses, universities and institutions in Poland and abroad at any time.

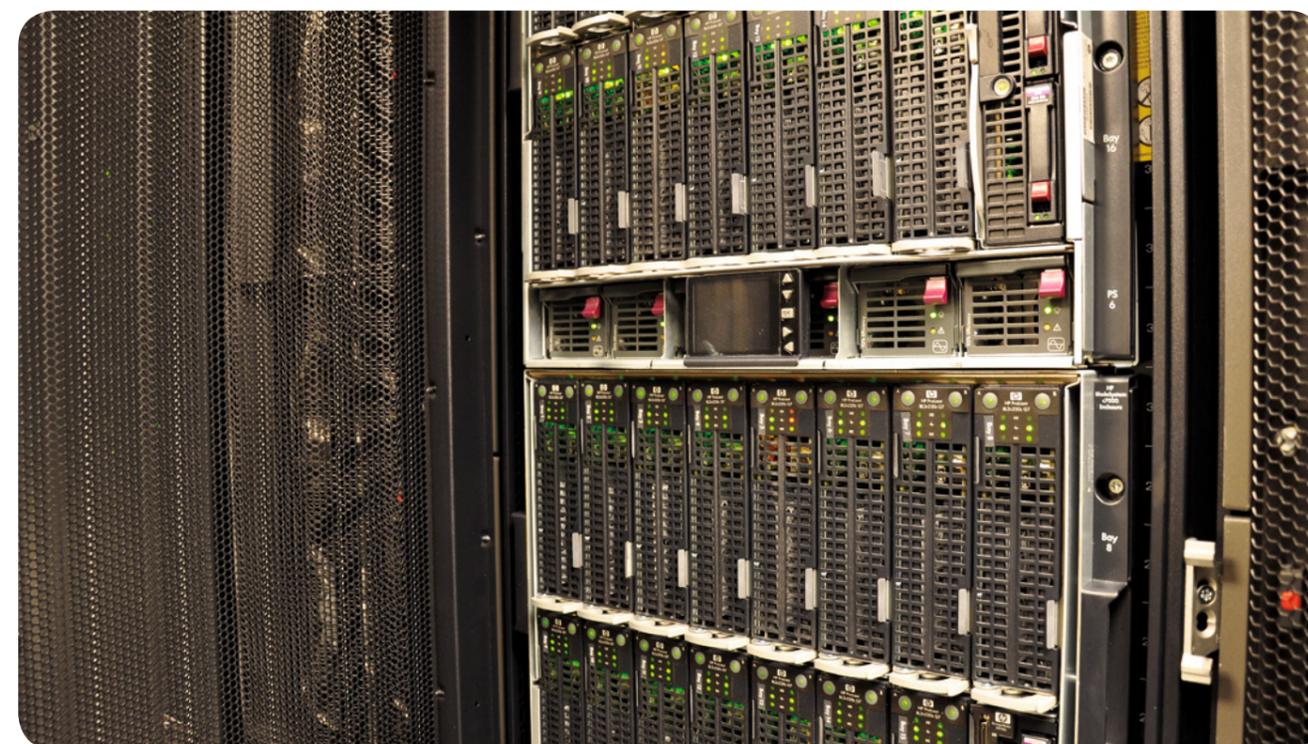
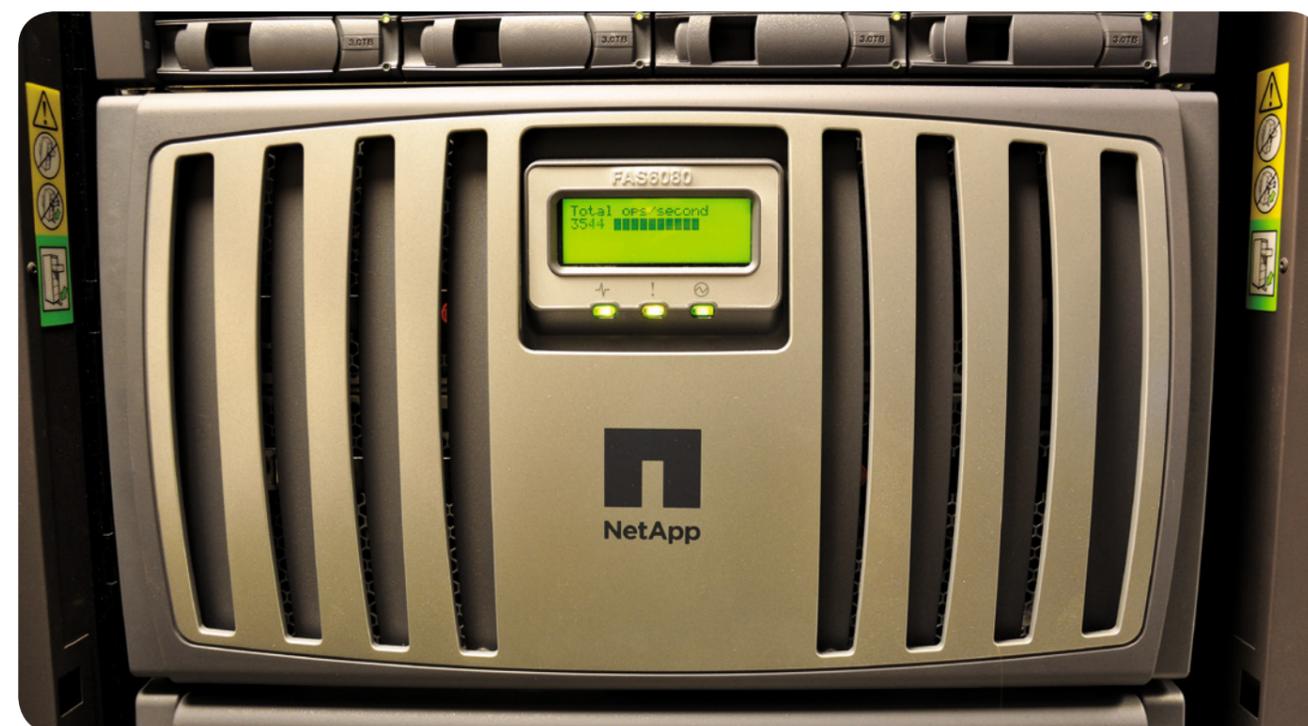
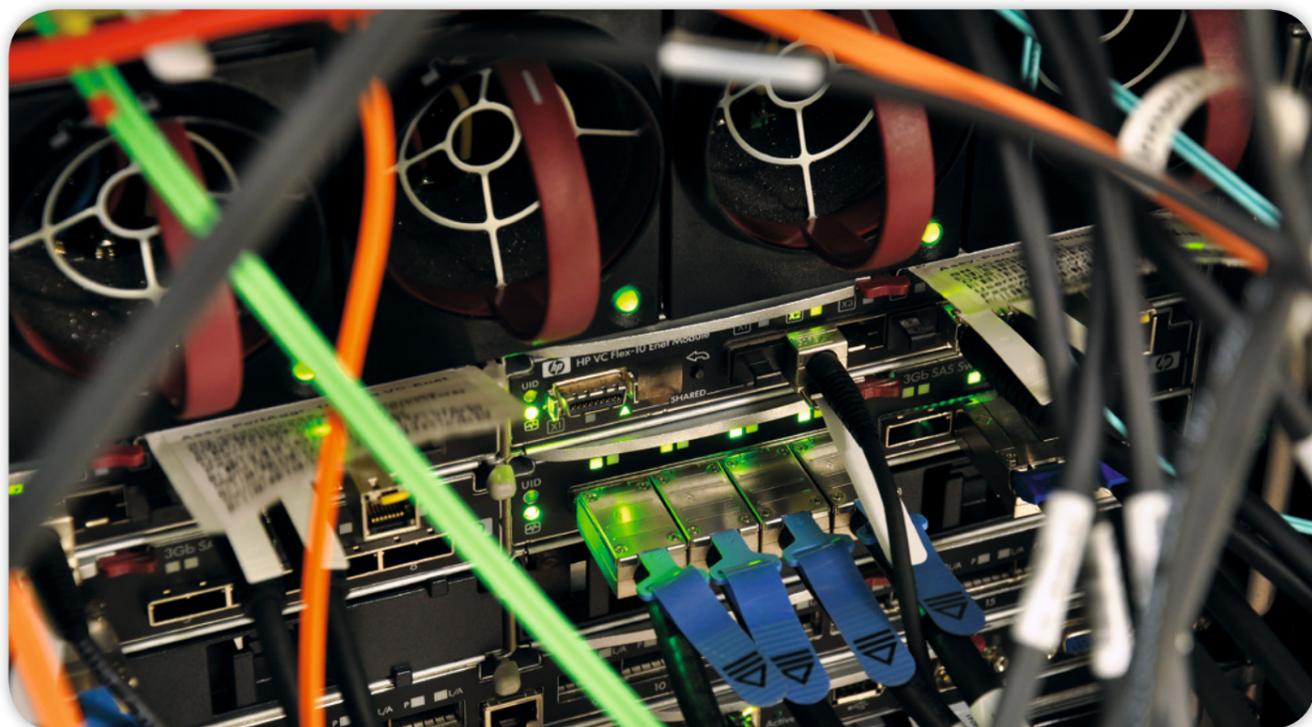
Project title: Creation of a universal, open, repository hosting and communication platform for network knowledge resources for science, education and an open knowledge society

Beneficiary: Warsaw University

Project value: 59 788 713 PLN

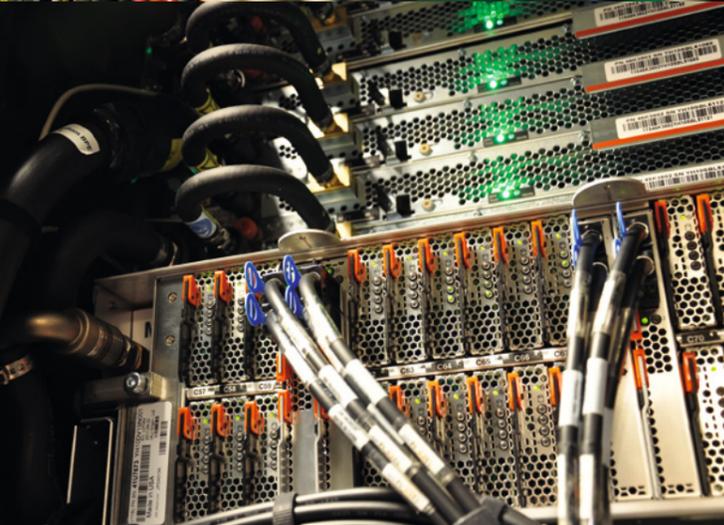
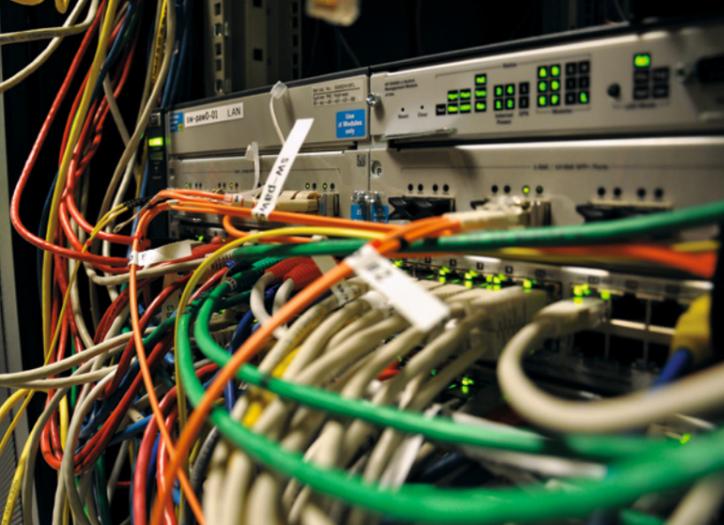
Implementation period: August 2010 – August 2013

Support area: Strategic research programme: „Interdisciplinary system for interactive scientific and science-technology information”



The system is to be characterized by open architecture – it will allow for easy adding of new functionalities. Its creators also expect that the resources will be increasing – therefore, they have made sure to make it scalable to secure the system against clogging with excessive amount of data. Many components of the system are based on open source licenses, which will allow for emergence of communities of new creators, who will develop the system in the future.

However, Synat is not only an IT project. It is an open science project, implementing a new approach to science and education. It is a great opportunity for promotion of Poland – only several advanced countries in the world are now working on similarly integrated systems.



Interview with
professor Marek
Niegódka
of ICM, the project
manager

What are the advantages of Synat?

The Synat system will allow for rendering access to all systems of repositories or publications of the Polish scientific institutions through a single portal. As a result, in a single system, under a single address, it will be possible to search various domestic and foreign resources, to analyze these resources and to get additional information and knowledge from these. Regardless of this, it will be still possible to use these resources directly – ownership of the content will remain in the place of their creation.

Will anyone be able to access any data?

We assume that wherever it is possible, we will be attempting to base our works on open models to ensure unlimited access. However, we expect that in some situations, owners of the content may introduce various limitations. This, for instance, pertains to scientific publications of many publishers in the world. Sometimes, access may be limited to include scientific institutions and universities.

When will Synat be ready to use?

The system already exists, but we are still working to improve it. We are getting close to a situation, in which it will be possible to present the preliminary version, providing access to limited resources. Starting at the beginning of next year, we will be gradually granting access to individual components. It should be kept in mind, however, that our project is a research task, and it is not associated with launching of a real, operating system on the national scale. It is only aimed at getting ready for its creation. It should also be underlined that large-scale IT systems require continuous development in association with progress of technology and constant emergence of new functionalities.

What is the quantity of resources that we can expect upon launching of Infona?

At present, the resources are not too developed, but they will have to be created very quickly, among other things, due to the fact that the Ministry of Science and University Education is now launching a system called POL-on, which is to collect all data on activity of universities, academic achievements and publications, and it will be the only source of information and knowledge for the purpose of assessment of academic institutions and researchers.

As of today, the resource base being prepared consists of more than 1650 titles of Polish scientific publications at the metadata level (that is, information on titles, authors, abstracts and key words). On the other hand, more than 100 Polish periodicals have signed agreements for placement of their full electronic editions in the system. These resources will be constantly updated. The number of publishers ready to participate is growing.

Investing in young scientists

Young, talented and ambitious scientists are one of the most important resources of every country, so they should be taken care of. One of the Polish ideas for supporting young scientists is the LEADER (LIDER) programme financed by the state. It has been functioning since August 2009.

The purpose of this programme is to provide resources for research works conducted by young Polish scientists (up to 35 years of age) in a Polish scientific and research unit. They can receive even PLN 1.2 million for carrying out their own projects. However, this does not refer to any project, but only those, which can be useful for the industry.

The programme should extend competences of young scientists in planning, management and realization of scientific projects and in management of research teams. The programme focuses also on encouraging cooperation of scientists with companies and mobility between high schools and scientific units.

During the first two editions of the programme there were 59 leaders selected. They received PLN 54.7 million for their research projects. The third edition ends in June 2012 and it will add more leaders to the group.

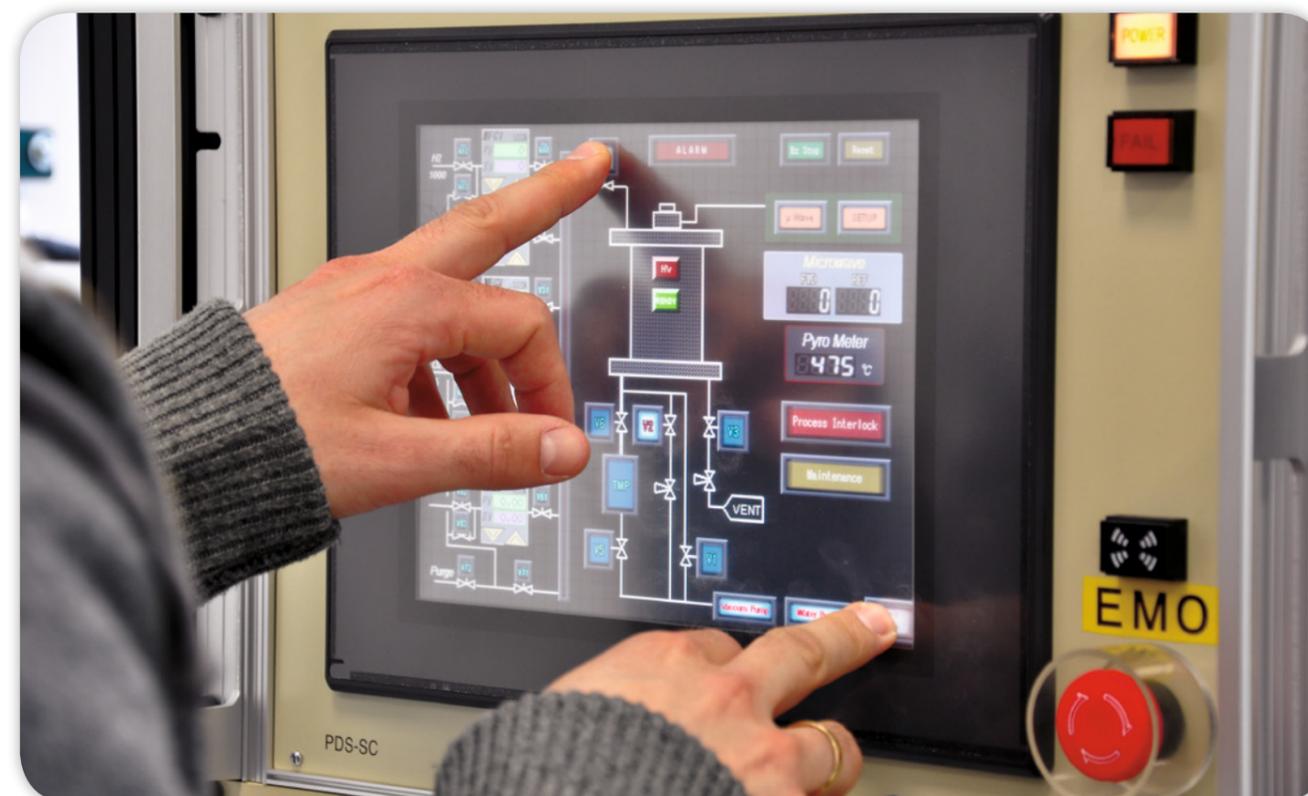
Project title: **DIAMDOP – Doped nano-diamond structures for electrochemical sensory applications**

Beneficiary: **Gdansk University of Technology**

Project value: **504 850 PLN**

Implementation period: **October 2010 – September 2013**

Support area: **LIDER programme**

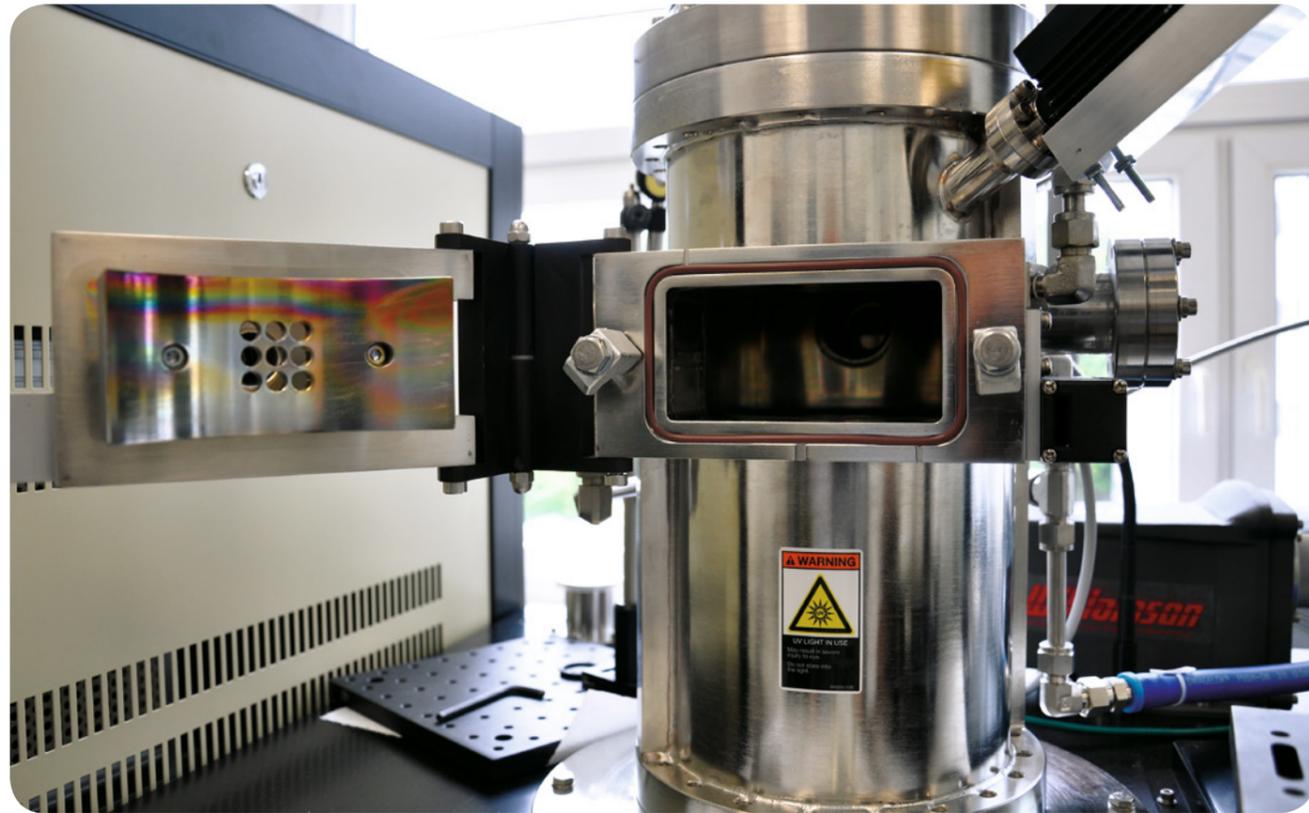


Control panel for the technological plasma system for synthesis of diamond layers.

This investment in talented scientists is necessary because of another, global reason. The world is fighting for young scientists. Schools, research institutes and companies from rich countries are eager to employ such persons from the countries, which do not have as much funds to be spent on science. According to the estimations, these rich countries already employ three million specialists educated by poorer countries. This means that the benefits of the investment are acquired by someone else.

The LEADER programme allows preventing such risk and keep the most talented scientists in Poland, providing them with resources for research and, therefore, realization of their scientific dreams.

One of the beneficiaries of the programme is dr inż. Robert Bogdanowicz from the Gdańsk University of Technology, who is working on innovative applications of diamond surfaces.



Plasma vacuum chamber for synthesis of diamond layers.



Mass flowmeters for precise metering of gases to a technological plasma chamber.



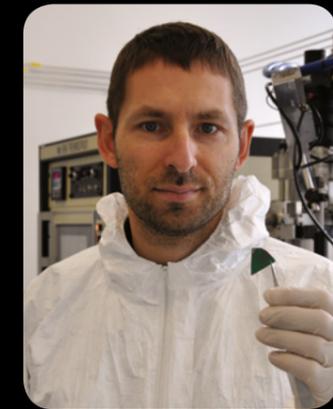
Samples of thin diamond layers synthesized on monocrystalline silicon used in semi-conductor industry.



An operator controlling the CVD plasma system in a clean-room laboratory.



Ultra-pure gases (hydrogen, methane, nitrogen) used for synthesis of diamond layers in the CVD process.



Interview with
dr inż. Robert
Bogdanowicz
from the Gdańsk
University of Technology

Why do you want to use diamonds to remove biological contaminations and waste?

Diamond is a very good material for electrochemical electrodes used for removing contaminations. It cannot be dissolved in practically any environment. But first of all, diamond allows very effective oxidation, which leads to mineralization of contaminations that are difficult to degrade. It is possible because of wider electrochemical window in relation to lead or graphite electrodes.

You are using synthetic diamonds. How are they created?

We use the MPA CVD technology (Microwave Plasma Assisted Chemical Vapour Deposition). Gases are sent to the vacuum chamber and stimulated by energy in the form of microwave radiation. A number of processes results in creation of bonds on the surface (for example titanium or silicon) between carbon with hybridization characteristic for diamond. The carbon itself is obtained from methane.

Such diamond layer is mixed with boron, which makes the ideal insulator, that is diamond, become a conducting material. The current flowing through it stimulates the movement of carriers, which results in oxidation reaction mineralizing and degrading the contaminations (for example pesticides, surfactants or aseptic substances).

How big can be the treatment plants using such solution?

There are prototype devices in Europe, which allow realization of for example a sewage treatment unit. We are presently focusing on creating a pattern material, but the target is to create a small prototype. We think about medium scale device, which could be used in laboratories or hospitals.

Is this the only application of diamond surfaces?

Such surfaces may be also used in sensors allowing detection of various substances, which presently require complex analyses (for example dopamine). It is also possible, using various organic components, to functionalize our surface to allow detection of different types of protein or analysis of DNA fragments. We also conduct research on covering titanium alloys used in endoprostheses.

What were the benefits of the LEADER programme for you?

First of all, I gained much more independence. The research conducted by me are very expensive, for example you need to purchase gases, which are absolutely necessary for the works. Therefore, each idea required negotiations with the management. Now I have my own resources and such conversations refer only to the merits and not finances.

Engineers at work

Various countries have various resources. Raw materials found underground seem to be the most valuable ones – enormous resources of crude oil or natural gas would turn many poor countries into wealthy ones. Sometimes, the way to get rich is to take advantage of the paradise-like landscape and excellent weather conditions, or the favorable geographic location. In fact, however, the real wealth of a country comes from its citizens. Their skills and talents can turn out to be sufficient to ensure the prosperity of a country, even if it has no valuable natural resources or suitable conditions to become an attractive tourism destination.

The European Union considers this to be the crucial resource – in 2007, it established the Operational Programme Human Capital (OP HC). Its basic objective is to invest in the skills and knowledge of the citizens. In Poland, one of the modes of implementation of this task is to support technical education, since a modern country cannot exist without an army of well-educated engineers.

One of the beneficiaries of the programme is the Silesian University of Technology. Thanks to the EU funds, it has implemented the project “Modernization and broadening of educational offer in the field of Automation and Robotics at the Faculty of Automation, Electronics and Information Science of Silesian University of Technology”, creating a new specialization “Information technologies in automation and robotics”.

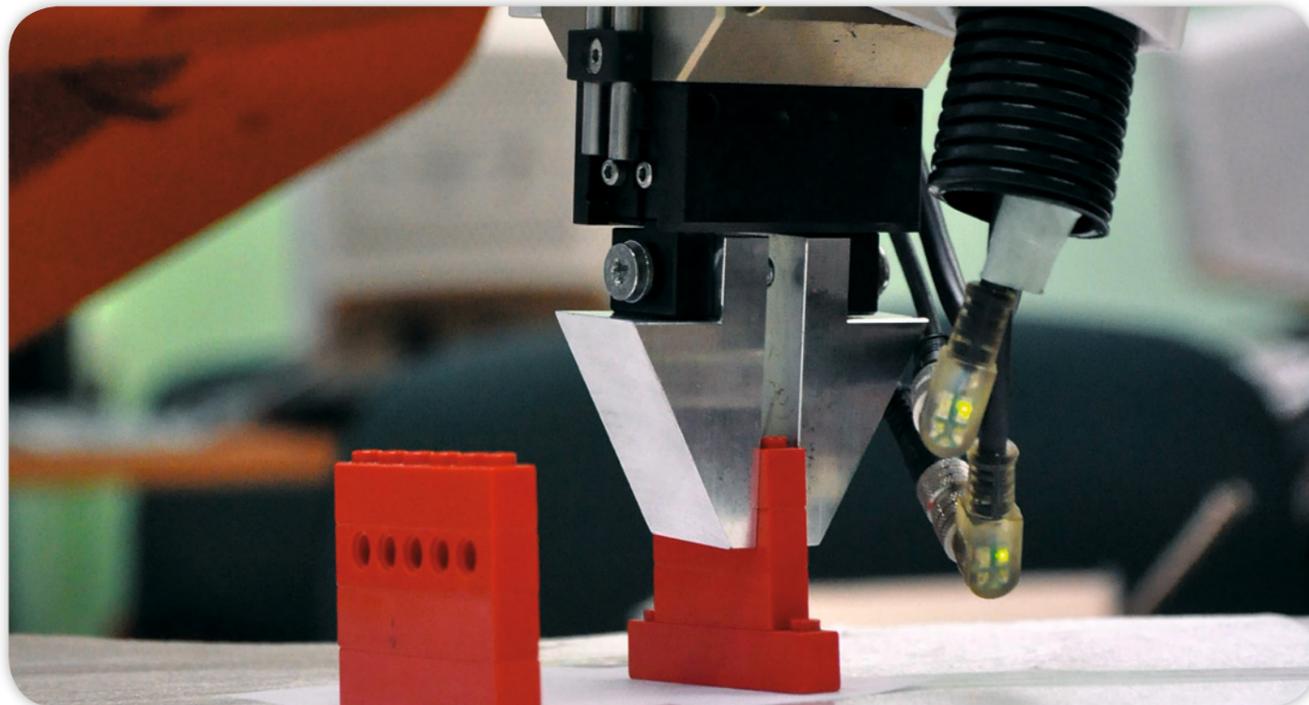
Project title: Modernization and development of education curriculum for specialization in Automatics and Robotics of the Faculty of Automatics, Electronics and Information Sciences of Silesian University of Technology

Beneficiary: Silesian University of Technology

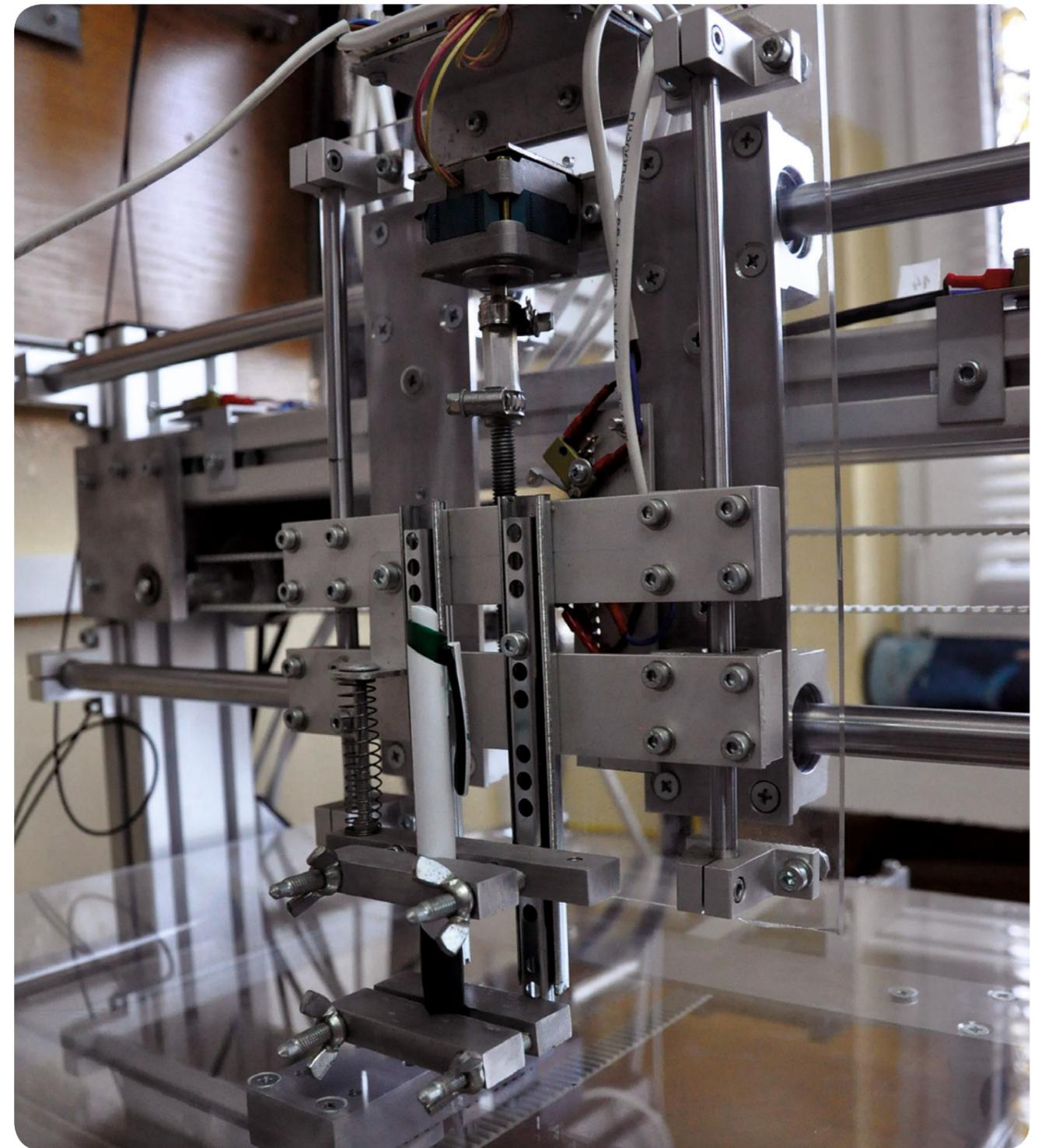
Project value: 2 144 435,64 PLN

Implementation period: January 2009 – September 2012

Support area: Human Capital Operational Programme, Sub-measure 4.1.1 Strengthening and development of didactic potential of universities



Sorting of materials by a robot.



Control of precise positioning.

For the money granted, the Silesian University of Technology has developed its laboratory equipment to teach new subjects. The staff has prepared modern teaching aids for the students, presenting in detail the content of every tutorial. This will enable the future engineers to listen, instead of copying notes from the blackboard.

Within the framework of the project, the university financed very popular additional courses in mathematics and physics, as well as visits and paid trainings for students at companies. Some of the money was spent on improvement of the qualifications of the academic staff, which, for instance, had the opportunity to attain professional experience at the leading Western universities, getting familiar with modern teaching methods. The faculty has also earned 12 doctoral students.



A user with an exoskeleton arm.



Laboratory of unmanned flying objects.



An industrial robot with a control panel.



Interview with engineer Marek Pawełczyk, Ph. D., professor at Silesian University of Technology

Is the "Information technologies in automation and robotics" a popular subject?

Yes, very much so. Creation of a new specialization and its promotion led to a situation, in which two years before launching of the project we had 0.8 high school graduates applying for enrollment per place, and now we have three. At present, we are able to enroll 200 students per year, 150 of these reach the stage of selection of the specialization, and more than a half of them chooses the „Information technologies in automation and robotics“.

Is the faculty engaged only in teaching or does it participate in research work as well?

Our academic staff not only teaches students, it also works on new solutions. Senior students also participate in research works – of course, within the limits of their abilities. Thanks to this, they not only learn to create innovative solutions, but they also learn how to implement projects. They are involved in research works through the student scientific associations, but they also participate with individual academic employees. Sometimes, they even become co-authors of scientific publications. Our greatest achievement is the exoskeleton of the upper limb, which is the artificial arm to support the activity of the real one, for instance, in disabled persons. This structure, which has been built by one of our doctoral students participating in the project, has won many international awards at exhibitions, including in Japan. We will also be working on artificial lower limbs.

What are the chances of your graduates on the labor market??

The bulletin board with work offers is always full here. 80 percent of our graduates find satisfactory jobs in accordance with their specialization within one month after graduation. They are employed by companies dealing with industrial IT science; many graduates work at companies offering services in the field of automation of factories and production lines. There is plenty of employers, because there are dozens of such companies on the Silesian markets; most of them employ no more than 10 to 20 people, but this is the specific nature of the industry.

Do you cooperate with potential employers in terms of student education?

Yes, and we are very happy to see that companies are eager to cooperate with us. We have signed many memorandums of understanding with such companies, which allows the students to participate in trainings and they visit companies, which allows them to get practical skills. We also receive many useful devices from companies, which are used for teaching purposes. Representatives of companies associated with our specialization are also the project council members. They participated in devising of new subjects and they assisted us in teaching preparations.

NCRD's programs implemented in 2011

Strategic research and development programs

Strategic research and development programs operate under big budgets, are closely related to the science and innovation policy adopted by the Polish government and contribute to the social development and economic growth of our country. The basis for their preparation is the National Research Program, adopted by way of resolution of the Council of Ministers dated 16 August 2011, which defines strategic research and development directions. The Council of the National Centre for Research and Development prepares strategic program projects according to the directions set forth in the aforementioned document and submits them for approval of the minister responsible for scientific affairs.

A strategic program comprises projects targeted at specific technical, scientific or social issues. Beneficiaries are selected in so-called top-down calls for proposals where applicants must fully meet the criteria defined in each announcement. The implementation of this kind of program contributes to consolidation of the best research teams and integration of scientific and business circles around problems crucial for the development of our country.

In 2011, the Centre was implementing two strategic research and development programs:

- Advanced Technologies for Energy Generation
- Interdisciplinary System for Interactive Scientific and Scientific Technical Information;

And three strategic research projects:

- Integrated System for Reducing Energy Consumption in the Maintenance of Buildings;
- Work Safety Optimization in Mines;
- Safe Nuclear Power Engineering Development Technologies.

In the second half of 2012 the third strategic program called "Prevention and treatment of civilization diseases – STRATEGMED" shall be announced.

Centre's programs



INNOTECH is a program whose aim is to help research entities and businesses carry out innovative projects representing various scientific areas and industrial sectors with a special focus on advanced technologies. The program is addressed to entities involved in research projects and preparatory studies preceding the implementation of research results, whose purpose is to develop and implement innovative technologies, products or services.

The INNOTECH Program ought to encourage businesses to invest in research and development and strengthen relations between science and business, which is to contribute to the increased share of advanced technology products in the revenues of companies involved in the Program, which, in the long term, shall translate itself into the foundations of dynamic increase of advanced technology products' share in the Polish GDP.



LIDER

The purpose of the LIDER Program is to help young scientists learn how to plan research on their own, manage and lead their own research teams while carrying out projects likely to be implemented on the market. The Program is also aimed at encouraging scientists to cooperate with businesses while performing economically valuable and implementable research and enhancing mobility and exchange between research sectors, universities and research units.



Technological Initiative I

Technological Initiative I was assigned to the National Centre for Research and Development on 29 February 2008 by the Minister of Science and Higher Education. The Program is oriented to the development of new products and technologies on the basis of Polish science and technology achievements. It is addressed to businesses, namely small and medium-sized ones and research teams directly associated with industrial sectors. Its purpose is to intensify research performed by businesses and scientists aimed at creating strong foundations for the increase in the Polish economy's innovation.

The Technological Initiative program is composed of two separate modules. While the first one is targeted at businesses and research units involved in innovative research and development, the second one was created for legal entities which enhance putting research results into practice on the market.



IniTech

IniTech is an initiative implemented by the National Centre for Research and Development under the Regulation adopted on 10 March 2009 by the Minister of Science and Higher Education. Its purpose is to initiate and reinforce the science- and technology-related cooperation between Polish research units and businesses. In the program participate companies, research units and scientific and industrial consortia which have come up with novel projects related to innovative technologies or products aimed to be applied on the market.

Patent Plus

The PATENT PLUS Program is a financial support instrument with the main purpose of increasing the intellectual property management effectiveness via patenting. It was created to encourage both scientists and management of research entities to file for legal protection of results of research and studies carried out by them. Its main objective is an increase in number of patent applications leading to a better protection of industrial property rights in Poland by way of co-funding or refunding of costs incurred by submittal of a patent application. The implementation of the program should make it easier to attract business partners, and, in an indirect manner, result in an intensified commercialization of developed inventions.

R&D projects

R&D projects include applied research or development works whose purpose is to find practical application. It is expected for their results to be used on the market or in social life. Projects of this kind are funded under the Regulation adopted by the Minister of Science and Higher Education on criteria and procedures of allocation and reimbursement of financial assets allocated for development projects.

Targeted projects

The Program was established to fund projects developed to create a new or modernized product or to implement a state-of-the-art technology. Its main objective is to create a system which would enable scientific research funding, development of scientific and research infrastructure and expansion of cooperation with business entities. Targeted projects are addressed to small and medium-sized businesses.

Targeted projects are funded under the Regulation adopted by the Minister of Science and Higher Education on criteria and procedures of allocation and reimbursement of financial assets allocated for targeted projects.

On 25 February 2011 the administration of both R&D and targeted projects was entrusted to the National Centre for Research and Development.

Programs and projects – defense and security

Since 2011 the National Centre for Research and Development, in cooperation with the Minister of National Defense and Minister of Internal Affairs, takes actions related to scientific research and studies for the purposes of national defense and security. In calls for proposals centered around specific research areas are selected undertakings the most likely to increase the national security. The purpose of programs and projects under implementation is not only to increase the opportunities for Polish scientific and industrial entities, but also to strive for a technological independence through the creation of Polish know-how in technologies critical for national defense and security.

International programs

NCRD's tasks also include the participation in the implementation of international research and development programs, including those co-financed with foreign funds. It is allowed by the cooperation with Polish and foreign partners. Not only does the bilateral cooperation lead to the accomplishment of the Centre's mission, but it also contributes to the reinforcement of the position of Polish research units within the world-wide and European Research Area (ERA).

One of the most important international programs are ERA-NET projects implemented under consecutive editions of the EU's framework programs. Their purpose is a regular exchange of information and experience between EU member states through the identification of common strategic subjects, followed by the implementation of supranational instruments supporting scientific research. NCRD bears responsibility for the initiation of cooperation and participation in ERA-NET projects under which international calls for research proposals funded with domestic resources are organized.

In 2011 the National Centre for Research and Development began working on other programs forecasted to be implemented in 2012.



Applied Research Program

The Applied Research Program of the National Centre for Research and Development is a horizontal program aimed at supporting the science sector and the industry sector within the scope of applied research in various scientific fields and industry branches. The program will be implemented on the basis of calls for proposals for co-financing of applied research projects. Applied research consists either in searching for possible practical uses for research results or in searching for new solutions allowing to meet the assumed practical targets.

BRIde: Research Development Innovations

BRIde is a pilot enterprise (former Commercialization of R&D results – testing new support mechanisms) whose purpose is to enhance the commercialization of R&D results through the development, testing and putting into practice of new intervention instruments. Under BRIde are identified specific needs of newly established businesses, mainly small and medium-sized ones, from within the area of commercialization of R&D results. A special emphasis is put on the identification of those needs which do not fit in the existing funding programs and schemes. BRIde shall also enable to test in practice new instruments and ways of commercialization of R&D results, which have not been applied so far. We expect that BRIde shall lead to the detection of market failures and mapping of gaps or irregularities within the funding measures offered by public institutions for the commercialization of R&D results. Once such information has been collected, factual findings shall make it possible to make a decision on the possible creation of a new program or programs focused on the commercialization of R&D results.



GRAF-TECH

Research on graphene inspires new technical solutions in various areas of life and economy. Numerous applications are expected, mostly in the electronic industry and medicine. The GRAF-TECH program is aimed at strengthening of the international position of Polish businesses involved in the production of graphene-based goods.

GRAF-TECH provides funds for scientific research, development works and preparatory work aimed at elaborating innovative graphene-based products. Resources are allocated for projects implemented by scientific and industrial consortia and centers including at least one private company.

START-TECH

The program is targeted at newly established businesses who have been operating for no longer than 6 years, mostly within the area of commercialization of research results and launching of innovative technologies on the market, specifically advanced technologies or innovations in services, mainly research ones. Funds are mostly allocated for the business run by spin-off/spin-out companies which make use of knowledge and know-how as well as property rights related to the use of technologies developed by the Polish scientific environment.

SPIN-TECH

The Program's purpose is to enhance entrepreneurial spirit in public research units so as to increase the effectiveness with which they commercialize R&D results. Funds are allocated for preparatory projects leading to the foundation of special purpose vehicles and their expansion.

Social Innovations

Social Innovations is a program which provides support for the scientific sector and its economic environment in decision-making and implementation of innovative actions and social initiatives, based upon state-of-the-art science and technology achievements. It is targeted at entities whose operations can stimulate social development and improve the quality of life with a special focus on those groups and areas which call for innovative solutions and new social initiatives.

European Funds

On 1 September 2011 the National Centre for Research and Development took over from the Ministry of Science and Higher Education tasks related to the implementation of European Funds allocated for the development of science and higher education sectors in Poland.

Via European Funds available to Poland since 2004 significant financial resources are spent not only on necessary infrastructure elements but also on the stimulation of entrepreneurship driven by innovative ventures and discoveries made by Polish scientists. In 2007-2013, under three operational programmes: Innovative Economy, Human Capital and Infrastructure and Environment, the Centre has gained access to over EUR 4.1 billion, allocated i.e. for: extension and revamping of Polish universities, research infrastructure, R&D projects, strengthening cooperation of Polish businesses with the research sector as well as for the maintenance of high educational standards and increase in number of students majoring in disciplines considered strategic for the sustainable development of the Polish economy.

Innovative Economy Programme

The basic stipulation of the Innovative Economy Operational Programme is the development of Polish economy by the support of institutions, such as enterprises and scientific establishments, engaged in innovative activities. The co-financing offered under the Operational Programme for Innovative Economy is addressed to innovative activities of entrepreneurs within the scope of R&D works, employment of IT and ICT technologies and creation of modern technological solutions. This improves the position of companies on the market and enables the creation of better work places. The co-financing of scientific activity conducted by enterprises in cooperation with research centres strengthens the links between the science and business sectors. The support is addressed to institutions of key importance to the entire economy that contribute to the increased innovativeness of companies and the development of entrepreneurship as well as strong centres providing capital for the execution of innovative ventures.

Since September 1st 2011 the National Centre for Research and Development acts as an intermediary in transferring the financial resources under two out of nine priority axes of the Innovative Economy Operational Programme:

Priority I. Research and development of modern technologies

- Measure 1.1. Support for scientific research for establishment of a knowledge-based economy
- Measure 1.2. Improvement of human potential of science
- Measure 1.3. Support for R&D projects for entrepreneurs carried out by scientific entities
- Measure 1.4. Support for goal-oriented projects

Priority II. R&D infrastructure

- Measure 2.1. Development of high research potential centres
- Measure 2.2. Support for development of research infrastructure of scientific entities
- Measure 2.3. Investments connected with development of IT infrastructure of science

Infrastructure and Environment Operational Programme

Measures under the Infrastructure and Environment Operational Programme are aimed primarily at the increase of investment attractiveness of Poland and its regions by the development of technical infrastructure with the simultaneous protection and improvement of the condition of the environment, health, preservation of cultural identity and development of territorial cohesion. The Programme involves the execution of 15 priorities. The main goal of priority axis XIII whose financial resources since September 1st 2011 are distributed by the National Centre for Research and Development is the development of modern university centres that would educate mostly specialists in modern technologies.

The tasks executed as part of Priority XIII are comprehensive investment projects of universities involving, in particular, the construction, reconstruction and modernisation of the existing university buildings (construction of modern lecture halls and laboratories), together with the furnishing with modern equipment used during studies and other solutions that allow for adapting the technical condition of the existing infrastructure to the new furnishing requirements, including the construction, expansion or development of safe broadband computer networks compatible with regional or national networks.

The execution of projects as part of priority axis XIII will primarily enable the improvement of students' access to modern didactic tools and IT and ICT technologies used for educational purposes, including broadband Internet, creation of conditions for greater participation of technical universities in the execution of European educational and research projects, opening to international programmes and adaptation to European standards as well as creation of additional places at faculties that are of key importance to the development of the Polish economy.

Human Capital Programme

The Human Capital Operational Programme is aimed at the facilitation of full usage of human potential by the increase in employment, improvement of the level of society's education, reduction of social exclusion areas and support for the creation of state administrative structures. The support under the Programme is focused on the following areas: employment, education, social integration, development of adaptation potential of employees and enterprises as well as issues related to the development of human resources in rural areas, creation of efficient and effective public administration at all levels, implementation of the good governance principle and promotion of labour resources health.

Priority IV of the Human Capital Operational Programme whose resources since September 1st 2011 are distributed by the National Centre for Research and Development is focused on the improvement of the quality of functioning of higher education institutions. It stipulates the improvement of curricula and their complementation with innovative elements, strengthening of the effectiveness of the education system and the improvement of human resources as well as the execution of university development programmes. The Programme finances projects which involve the adaptation of study curricula and majors to the requirements of the labour market, the increase of competences and level of students' knowledge in the fields that are of key importance to the economy, cooperation between educational system institutions, enterprises and research-and-development sector. A very important element includes measures aimed at the development of didactic potential of universities and supporting development of faculties of technical, mathematical and natural science studies.

Priority IV Higher education and science structure is as follows:

Measure 4.1. Strengthening and development of didactic potential of the university and increase in the number of graduates from faculties of key importance to the knowledge-based economy

Measure 4.2. Development of qualifications of the R&D human resources and increasing the awareness of the role of science in economic development

For more information on the Centre's programs, please visit our website – www.NCRD.gov.pl.

Tasks accomplished in 2011

Item.	Description of the task (accomplished, under implementation – from 01.01 to 31.12.2011)	Effects of the task	Way of spreading information on achieved results *	Funds granted (in thous. PLN)
1	2	3	4	5
1	Strategic research project called „Integrated System for Reducing Energy Consumption in the Maintenance of Buildings”	Within the framework of the aforementioned strategic program two research tasks were completed. As a result of the above, amendments to the laws in force were recommended, characteristics of low energy buildings and their environment as well as input data for urban energy consumption audits and municipal energy saving policy were developed and collected.	1, 2, 3, 6	10 955
2	Strategic research program called „Work Safety Optimization in Mines”	Research tasks have been performed under the aforementioned strategic program since September 2011.	–	1 923
3	Strategic research project called „Safe Nuclear Power Engineering Development Technologies”	Research tasks have been performed under the aforementioned strategic project since August 2011.	–	2 885
4	Targeted projects	Supervision over implementation, funding and reckoning of 152 projects.	2	52 995
5	R&D projects	Supervision over implementation, funding and reckoning of 660 projects.	2	275 991
6	Commissioned research projects	Supervision over implementation, funding and reckoning of 12 projects.	2	3 901
7	ERA-NET international projects	Supervision over implementation, funding and reckoning of 64 projects.	2	16 227 (the amount does not include ERA-NET CORNET II applications evaluation costs which amount to PLN 1 815,87)
8	EUROSTARS program	NCRD has been participating in 19 international calls for proposals where 145 applications including Polish applicants were filed in total.	2	2 466
9	EUREKA initiative	Supervision over implementation, funding and reckoning of 11 projects. Participation of NCRD in the 6th and 7th call for proposals – 18 applications with Polish entities as participants were filed in total.	2	5 342
10	AAL program	Supervision over implementation, funding and reckoning of 2 projects.	2	857 (the amount does not include AAL's membership fee – PLN 41 345)
11	JU ENIAC	Supervision over implementation, funding and reckoning of 10 projects. Participation of NCRD in the 4th and 5th call for proposals – 3 international projects with Polish entities as participants got funding.	2	2 298
12	Multiannual Program „Optimization of Work Safety and Conditions”	Definitive reckoning of 72 projects accomplished at the first stage of the program. Supervision over implementation, funding and reckoning of 79 projects implemented under the second stage of the program.	2	10 500
13	Multiannual Program „Polish Artificial Heart”	Supervision over implementation, funding and reckoning of 12 research tasks (covered by 3 enterprises)	2	3 474
15	Programs focused on research, development and preparatory works preceding implementation of technologies with huge development opportunities	GRAF-TECH program: - brief of the program oriented to innovative graphene-based solutions; - establishment of the program.	2	–

Item.	Description of the task (accomplished, under implementation – from 01.01 to 31.12.2011)	Effects of the task	Way of spreading information on achieved results *	Funds granted (in thous. PLN)
1	2	3	4	5
16	Programs focused on research, development and preparatory works preceding implementation in key sectors of our economy	INNOMED program Sector program dedicated to the aviation industry – briefings and draft agreement between NCRD and aviation associations.	2	–
17	Programs focused on research, development and preparatory works preceding implementation in key sectors of our economy in cooperation with other entities	NCRD and National Fund of Environmental Protection and Water Management's common program: - brief of the program focused on pro-ecological technologies; - conclusion of an agreement between NCRD and NFEFWM	2	–
18	Polish-Norwegian Research Program	Development of the program draft together with Norway Research Council, its submittal to the national contact point – Ministry of Regional Development for validation.	2	–
19	Technological Initiative I	Supervision over implementation, funding and reckoning of 71 projects.	2	16 991
20	IniTech program	Supervision over implementation, funding and reckoning of 68 projects.	2	62 424
21	KadTech program	Conclusion of 2 funding contracts. Supervision over implementation, funding and reckoning of 2 projects.	2	126
22	BroTech program	Conclusion of 2 funding contracts. Supervision over implementation, funding and reckoning of 2 projects.	2	75
23	Innovation Creator program	Conclusion of 24 agreements for project execution. Supervision over implementation, funding and reckoning.	2	3 689
24	Patent Plus program	Conclusion of 11 agreements for project execution. Supervision over implementation, funding and reckoning.	2	247
25	LIDER program	First call for proposals – supervision over implementation, funding and reckoning of 23 projects.	2	7 540
		Second call for proposals – conclusion of 36 funding contracts. Supervision over implementation, funding and reckoning.	2, 3	3 724
		Third call for proposals – organization and start-up of the call	2, 4, 5	–
26	INNOTECH program	INNOTECH program (split into two paths – InTech and HiTech) • briefing of the program, • establishment of the program (approval of NCRD's Council); • development of implementation documents for InTech and HiTech paths (Regulations of the first call for proposals – blank applications, agreements etc.); • announcement and collection of applications under the first call for proposals; • evaluation of the form and contents of applications filed in the first call for proposals; (election of the winners of the first call for proposals, conclusion of funding contracts – 2012)	2, 4, 5	–
27	New scheduled programs: SPIN –TECH START TECH, SOCIAL INNOVATIONS	• identification of needs and briefings of new national programs: START –TECH program START-TECH program SOCIAL INNOVATIONS program (establishment of the aforementioned programs scheduled for 2012 as soon as the Centre's Council has approved them)	–	–

Item.	Description of the task (accomplished, under implementation – from 01.01 to 31.12.2011)	Effects of the task	Way of spreading information on achieved results *	Funds granted (in thous. PLN)
1	2	3	4	5
28	National defense and security development projects from the calls for proposals no. IV-XII (221 projects – 173 under implementation; 48 accomplished) National defense and security projects from the call for proposals no. 1/2011 (24 projects under implementation since December 2011)	Demonstrators: technology, product, system.	1, 2, 3 7 – seminars, exhibitions, presentations	388 094
29	Projects targeted at national defense and security (28 projects - 22 under implementation; 6 completed)	prototypes, technical documentation, test batch	1, 2, 3 seminars, exhibitions, presentations	19 311
30	National defense and security research projects from the calls for proposals 34-40 (132 projects - 91 under implementation; 41 completed)	Expert reports, reviewed doctoral theses – 5 PhD degrees – 3 habilitation theses – 4	1, 2, 3 seminars	9 334
31	Reckoning of agreements concluded for 100 national defense and security projects taken over from the Ministry of Science and Higher Education (64 development projects; 23 research projects, 13 targeted projects) – under execution	–	–	–
32	First Polish-Israeli Call for Proposals	Two agreements signed in December 2011	2	– środki zostaną wypłacone beneficjentom w 2012 r.
33	Second Polish-Israeli Call for Proposals	The procedure has not been completed yet, in January 2012 experts from Poland and Israel shall select projects which will proceed to the second stage.	2, 3, 6 prezentacje	–
34	Call for proposals under ERA-NET RUS	The procedure has not been completed yet, in February 2012 after the assessment carried out by international experts, a list of eligible projects shall be developed.	–	–
35	Call for proposals under KORANET	Organization of the call for proposals which shall be announced in February 2012	–	–
36	12th and 13th call for proposals under CORNET initiative (network cooperation)	• 12th edition of CORNET: • establishment of the CORNET initiative (approval by NCRD's Council) • development of CORNET program's documentation, • announcement and collection of applications during the 12th and 13th calls for proposals • evaluation of the form and contents of applications filed under the 12th call for proposals, • (selection of winners of the 12th and 13th calls for proposals, conclusion of funding contracts – 2012)	2, 4, 5	–
37	Polish-German call for proposals related to sustainable development research	The procedure has not been completed yet; in January 2012 the ranking of applications, developed by Polish and German experts shall be published, while agreements for project execution shall be signed around March-April 2012.	–	–

Item.	Description of the task (accomplished, under implementation – from 01.01 to 31.12.2011)	Effects of the task	Way of spreading information on achieved results *	Funds granted (in thous. PLN)
1	2	3	4	5
38	Polish-Luxemburg call for proposals related to innovative services	On 8 November 2011 NCRD signed with a research funding agency from Luxemburg an agreement whose purpose was, i.a., announcement of bilateral calls for proposals within specific areas.	–	–
39	Polish-Taiwanese call for proposals	NCRD and National Science Council from Taiwan are negotiating a cooperation agreement. The final content of the document shall be agreed upon in 2012, then the parties shall start negotiating terms and conditions of a common call for research proposals	–	–
40	<p>Since 1 September 2011 the National Centre for Research and Development has been acting as an intermediary body for : Innovative Economy Operational Program under trilateral agreements concluded by the Minister of Regional Development, Ministry of Science and Higher Education and National Centre for Research and Development on 30 August 2011.</p> <p>Under the Innovative Economy Operational Program, NCRD supervises the Information Processing Center and Polish Agency for Enterprise Development which act as Implementing Bodies: Information Processing Center – under sub-actions 1.3.1 and 1.3.2, PAED under Action 1.4</p>	<p>As for the Innovative Economy Operational Program, in the accounting period</p> <ul style="list-style-type: none"> • (from 01.09.2011 to 31.12.2011) • NCRD • did not collect any applications, • concluded one funding agreement for the amount of PLN 79 988 966, • granted beneficiaries with PLN 532 904 603.23 in total <p>In the accounting period (from 01.09.2011 to 31.12.2011):</p> <p>IPC</p> <ul style="list-style-type: none"> • collected, under sub-action 1.3.2, applications for the call for proposals no. 2/2011 in the period from 03.10.2011-30.11.2011 for the amount of PLN 24 000 000, throughout which 140 applications for the total funding amount of PLN 61 110 432 were filed, • did not sign any agreements with beneficiaries, • transferred to beneficiaries PLN • 54 541 563.46 in total, <p>PAED</p> <ul style="list-style-type: none"> • collected applications for the call for proposals no. 2/2011 within the period from 29.08-to 30.09.2011 for the amount of PLN 199 030 000, throughout which 588 applications for the total funding amount of PLN 2 264 332 678 were filed, • signed 73 agreements for PLN 212 252 029 in total, • transferred PLN 58 994 639.67 in total to beneficiaries. 		<p>532 904 including 451 019 850.59 from the European Union</p> <p>54 541 including 54 541 563.46 from the European Union</p> <p>58 994 including 57 282 812.27 from the European Union</p>

Item.	Description of the task (accomplished, under implementation – from 01.01 to 31.12.2011)	Effects of the task	Way of spreading information on achieved results *	Funds granted (in thous. PLN)
1	2	3	4	5
41	Since 1 September 2011 the National Centre for Research and Development has been acting as an Intermediary Body for the Human Capital Operational Program under trilateral agreements concluded on 30 August 2011 by the Minister of Regional Development, Ministry of Science and Higher Education and National Centre for Research and Development.	<p>As for the Human Capital Operational Program, in the accounting year (from 01.09.2011 to 31.12.2011)</p> <p>NCRD</p> <ul style="list-style-type: none"> • collected applications twice (calls for proposals no. 1 • and 2/2011 between 30.09.2011 and 02.11.2011), for the amount of PLN 60 000 000, throughout which 218 applications were filed for the total amount of PLN 301 174 110), • signed 15 agreements for the total funding amount of PLN 43 631 630, • transferred PLN 204 352 906.82 to beneficiaries. 		<p>204 352 including 182 765 673.06 from the European Union</p>
42	<p>Since 1 September 2011 the National Centre for Research and Development has been acting as an Intermediary Body for the Infrastructure and Environment Operational Program under trilateral agreements signed on 30 August 2011 by the Minister of Regional Development, Ministry of Science and Higher Education and National Centre for Research and Development.</p> <p>XIII Priority of the Infrastructure and Environment Operational Program within the area of higher education – projects implemented by leading academic centers which offer to young people educational programs which would contribute to the largest extent to the competitiveness of our economy and attract investors. They include so-called „priority programs“.</p> <p>It is the Information Processing Centre which acts as an Implementing Body with regard to the Infrastructure and Environment Operational Program.</p>	<p>As for the Infrastructure and Environment Operational Program, in the accounting period (from 01.09.2011 to 31.12.2011)</p> <p>OPI</p> <ul style="list-style-type: none"> • did not collect any applications, • did not conclude any agreements, • transferred PLN 200 124 285,14 to beneficiaries. 		<p>200 124 including 163 764 285.14 from the European Union</p>
Razem				1 952 339

* the following dissemination ways are identified with the numbers from the aforementioned columns: 1 – conference, 2 – article on website, 3 publication in print, 4 – publication in Public Information Bulletin, 5 – training course, 6 – workshops, 7 – other

NCRD's finances

Office of the Centre – execution handling costs generated by each task

Task's no. according to the budget	Tasks / sub-tasks under execution	Task handling cost	including targeted subsidy for investment	including EU funds granted
<i>in thous. PLN</i>				
1	2	3	4	5
	TOTAL EXPENDITURE	28 087	1 184	7 863
3.2.	Higher education	2 877	130 799	2 443
3.2.2.	Education offered by higher education institutions	1 005	71 303	854
3.2.5.	Higher education infrastructure	1 872	59 496	1 591
10.1.	Performance of scientific research	1 867	86 048	278 882
10.1.1.	Support for scientific research	1 641	75 064	275 878
10.1.2.	Human potential enhancement	225 805	10 984	3 004
10.2.	Reinforcement of scientific research applicable in practice	19 919	900 364	2 228
10.2.1.	Support for applied R&D	13 747	600 176	2 146
10.2.2.	Multiannual Program – "Optimization of Work Safety and Conditions – 2nd stage" (CIOP)	0	0	0
10.2.3.	Multiannual Program – Polish Artificial Heart	0	0	0
10.2.4.	National defense – scientific research	6 171	300 188	82 100
10.3.	Science infrastructure extension	3 002	58 358	2 551
10.3.1.	Investments in scientific research	3 002	58 358	2 551
10.5.	Business digitalization and creation of information society	422 816	8 210	359 393
10.5.2.	Science IT infrastructure extension	422 816	8 210	359 393

Office of the Centre – implementation of the financial plan

Item	Description	Plan according to budget act	Modified plan	Execution	Execution %
<i>in thousand PLN</i>					
1	2	3	4	5	6
I	TOTAL INCOME	627 830	1 352 050	1 160 747	86%
1	Government's subsidies	627 600	1 351 820	1 160 492	86%
1.1	- subject-related	17 235	20 203	17 951	89%
1.2	- targeted	609 777	1 330 608	1 141 610	86%
1.3	- investments and capital expenditure	588	1 009	931	92%
2	Funds granted by the EU	230	230	255	111%
II	EXPENDITURE	627 830	1 352 050	1 160 747	86%
1	including expenditure according to specific type	17 465	32 959	24 677	75%
1.1	- materials and energy	240	491	199	41%
1.2	- other external services	3807	8 274	7 338	89%
1.3	- salaries	10 443	18 662	13 804	74%
	-personnel	7 430	11 777	10 177	86%
	-other	3 013	6 885	3 627	53%
1.4	- social security premiums	1 120	1 987	1 428	72%
1.5	- Labor Fund premiums	181	310	228	74%
1.6	- Other operating costs	1 674	3 235	1 680	52%
2	including those generated by the execution of statutory tasks	609 777	1 317 742	1 132 660	86%
3	European funds	0	1 195 263	909 374	76%

Resolutions adopted by NCRD's Council

11 meetings of the Council were held last year. At the aforementioned meetings and 3 suffrages in rotary mode, the Council managed to adopt 45 resolutions:

- Resolution no. 3/2011 from 27 January 2011 on the adoption of the Regulations of the Council of the National Centre for Research and Development,
- Resolution no. 4/2011 from 27 January 2011 on the validation of the Centre's financial plan project and financial plan split into tasks for the year 2011,
- Resolution no. 5/2011 from 24 February 2011 r. on the validation of the project called ERA-Net on the Industrial Handling of Raw Materials for Europe Industries,
- Resolution no. 6/2011 from 24 February 2011 on the validation of the project called M-Era.Net from material science and engineering to innovation for Europe,
- Resolution no. 7/2011 from 24 February 2011 on the validation of the CORNET project,
- Resolution no. 8/2011 from 24 February 2011 on the validation of an annex project submitted by the University of Science and Technology,
- Resolution no. 9/2011 from 24 February 2011 on the adoption of the Operational Regulations for the Appeal Commission of the National Centre for Research and Development,
- Resolution no. 10/2011 from 24 February 2011 on the recruitment and employment of the Centre Council's members as reviewers by the National Centre for Research and Development,
- Resolution no. 11/2011 from 25 March 2011 on the adoption of the Regulations of the Appeal Commission of the National Centre for Research and Development,
- Resolution no. 12/2011 from 25 March 2011 on the validation of the report on operations performed by the National Centre for Research and Development in 2010,
- Resolution no. 13/2011 from 25 March 2011 on the validation of the financial statement of the National Centre for Research and Development for the accounting year 2010,
- Resolution no. 14/2011 from 25 March 2011 on changes of NCRD's financial plan for the year 2011 and NCRD's expenditure scheduled for the years 2011-2013 and split into tasks,
- Resolution no. 15/2011 from 25 March 2011 on the validation of the remuneration paid to the Deputy Director of the National Centre for Research and Development,
- Resolution no. 16/2011 from 25 March 2011 on the validation and approval of the INNOTECH program,
- Resolution no. 17/2011 from 25 March 2011 on the validation of the members of the Steering Committee of the strategic R & D program called „Interdisciplinary System for Interactive Scientific and Scientific Technical Information”,
- Resolution no. 18/2011 from 25 March 2011 on the validation of an annex project submitted by the Institute of Fluid-Flow Machinery, PAS,
- Resolution no. 19/2011 from 28 April 2011 on the validation of the operational plan of the National Centre for Research and Development for the year 2011,
- Resolution no. 20/2011 from 28 April 2011 on the validation of NCRD's adherence to the ERA-NET initiative plus OLAE+,
- Resolution no. 21/2011 from 28 April 2011 on the validation of NCRD's adherence to the ARTEMIS initiative,
- Resolution no. 22/2011 from 28 April 2011 on the validation of members of teams responsible for evaluation of offers for performance of research tasks under strategic research programs called Safe Nuclear Power Engineering Development Technologies and Work Safety Optimization in Mines,

- Resolution no. 23/2011 from 26 May 2011 on the validation of the operational plan of the National Centre for Research and Development for the year 2011,
- Resolution no. 24/2011 from 29 June 2011 on the validation of an annex project submitted by the Czestochowa University of Technology,
- Resolution no. 25/2011 from 28 July 2011 on the validation of the cooperation agreement between the National Centre for Research and Development and Fonds National de la Recherche,
- Resolution no. 26/2011 from 29 August 2011 on changes in NCRD's financial plan for the year 2011 (voting in rotary mode),
- Resolution no. 27/2011 from 22 September 2011 on the validation of NCRD's adherence to the ERA-NET Euphresco II project within the area of phytosanitary plant protection,
- Resolution no. 28/2011 from 22 September 2011 on the selection of one of the topics listed in the National Research Program for a strategic program,
- Resolution no. 29/2011 from 11 October 2011 on the definition of criteria to be met by strategic programs (voting in rotary mode),
- Resolution no. 30/2011 from 18 October 2011 on the grounds for the Council's opinion on the submittal of ERA-NET type projects to the National Centre of Science by the Director of the Centre (voting in rotary mode),
- Resolution no. 31/2011 from 27 October 2011 on the validation of the third call of the LIDER program,
- Resolution no. 32/2011 from 27 October 2011 on the validation of the Applied Research Program,
- Resolution no. 33/2011 from 27 October 2011 on the validation of proposed changes to the Act on the National Centre for Research and Development,
- Resolution no. 34/2011 from 27 October 2011 on the validation of the INNOMED program and draft agreement to be signed with the Technology Platform for Innovative Medicine,
- Resolution no. 35/2011 from 27 October 2011 on the definition of new research tasks aimed at the implementation of the strategic research project called Safe Nuclear Power Engineering Development Technologies and terms of calls for proposals for performance of research tasks,
- Resolution no. 36/2011 from 27 October 2011 on the validation of NCRD's adherence to the ERA-NET NEURON II project within the area of neuroscience,
- Resolution no. 37/2011 from 27 October 2011 on the validation of the pilot undertaking called „Commercialization of R&D results – testing of new support mechanisms”,
- Resolution no. 38/2011 from 24 November 2011 on the validation of the GRAF-TECH program,
- Resolution no. 39/2011 from 24 November 2011 on the validation of the amendment submitted by the Director of the Centre to the Applied Research Program,
- Resolution no. 40/2011 from 24 November 2011 on the validation of the PATENT PLUS program,
- Resolution no. 41/2011 from 24 November 2011 on the validation of the Innovation Creator program,
- Resolution no. 42/2011 from 24 November 2011 on the validation of the Centre's traditional financial plan and the one split into tasks, both for the year 2012,
- Resolution no. 43/2011 from 24 November 2011 on the validation of the conclusion by NCRD of an agreement with National Science Council (NSC) – Taiwanese research financing body,
- Resolution no. 44/2011 from 24 November 2011 on the validation of the conclusion by NCRD of an agreement with the Polish Aerospace Technology Platform,
- Resolution no. 45/2011 from 20 December 2011 on the validation of the draft operational plan of the National Centre for Research and Development for the year 2012,
- Resolution no. 46/2011 from 20 December 2011 on the validation of the evaluation plan for the year 2012,
- Resolution no. 47/2011 from 20 December 2011 on the validation of NCRD's adherence to the ERA-NET EuroNano-Med II project within the area of nanomedicine.

