

ANNUAL REPORT 2015

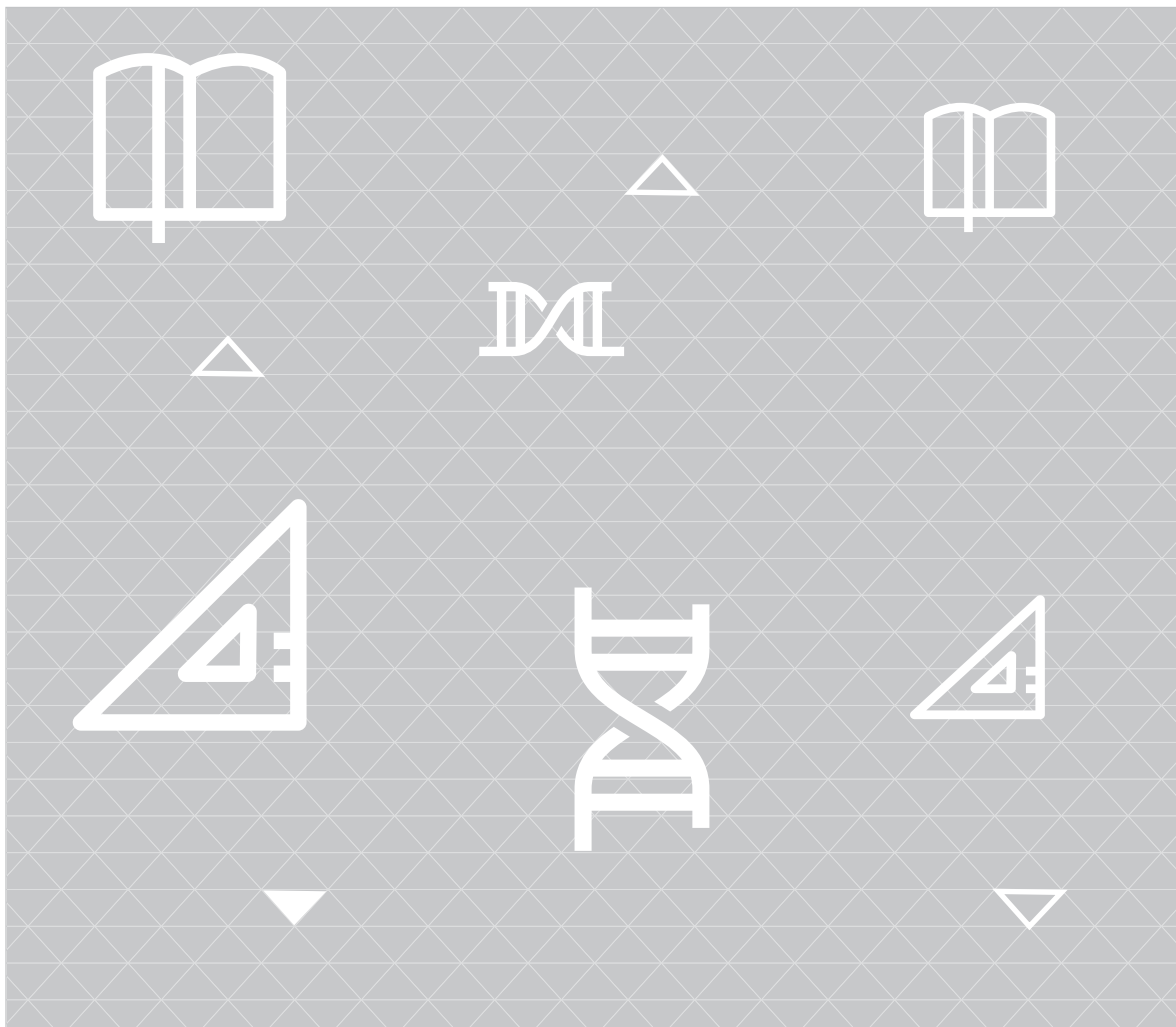


NATIONAL SCIENCE CENTRE
POLAND

ISSN 2450-5994

National Science Centre in Poland
ul. Królewska 57, 30-081 Krakow
tel. +48 12 341 90 03
fax: +48 12 341 90 99
e-mail: biuro@ncn.gov.pl
www.ncn.gov.pl

BASIC
RESEARCH
**IS THE ESSENCE
OF ALL SCIENCE**



Contents

About the National Science Centre	6
• General information	7
• Mission and goals	8
• 2015 Highlights	9
• Director	10
• NCN Council	10
• Office	11
• Coordinators	11
• Structure	12
Execution of NCN tasks in 2015	14
• NCN in numbers	15
• Funding schemes	16
• NCN Panels	20
• Funding basic research	21
• The proposal evaluation process	29
• Costs in NCN grants	36
• Monitoring of Project Implementation	38
• International Cooperation	39
• Events	44
• Budget and accounts	45
Research stories	48

ABOUT THE NATIONAL SCIENCE CENTRE

General information

The National Science Centre (Narodowe Centrum Nauki, NCN) is a government executive agency set up to fund basic research. Basic research is original experimental or theoretical research work that strives to expand knowledge of the fundamentals of phenomena and observable facts. It is not intended to have any direct commercial application or use. The NCN announces calls for research projects, pre-doctoral scholarships and post-doctoral internships on a regular basis. The funding programmes are open to all researchers at all stages of their research career. The Centre follows a strictly bottom-up approach, giving researchers the freedom to choose their research topic. One

of the NCN's priorities is to foster international cooperation and disseminate information about NCN's funding opportunities among researchers. The high quality of funded projects is ensured by a two-step peer review assessment procedure, which takes into account not only the scientific excellence of the research project, but also the research portfolio of the applicant. The NCN also supports and monitors the progress of research projects financed under its funding opportunities through review and examination of annual and final reports, as well as on-site visits to selected host institutions.

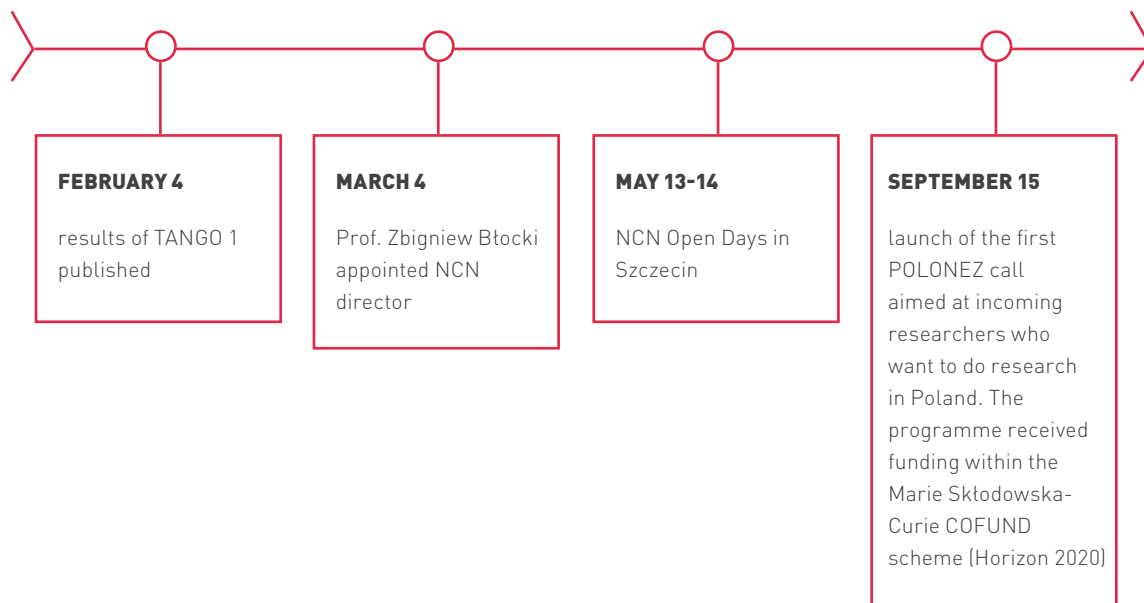
Our mission

Supporting the development of Polish research on the international arena and leveraging the quality and effectiveness of research through a competitive grant system

Our goals

- funding excellent research projects in basic research
- supporting researchers starting their career in research
- inspiring the creation of large, interdisciplinary research teams which are able to compete internationally
- fostering international cooperation in research
- creating new job opportunities in NCN-funded projects

2015 HIGHLIGHTS



Director

The Director of the National Science Centre, selected within the competition and appointed by the Minister of Science and Higher Education, is responsible for financial management as well as the correct and efficient completion of NCN tasks. The director is also in charge of international cooperation and acts as a legal representative on behalf of the Centre. Since March 2015 this position has been held by prof. Zbigniew Błocki.

NCN Council

The NCN Council is a policy body consisting of 24 distinguished researchers selected from candidates appointed by Polish scientific institutions. The Council sets priority areas in basic research, decides on the type of programmes and specifies call regulations. Its range of competencies also includes electing members of the expert teams responsible for proposal evaluations.

NCN Council in 2015

Prof. Michał Karoński – chair

Arts, Humanities and Social Sciences (HS)

Prof. Maciej Grochowski

Prof. Janina Józwiak (chair of HS Committee)

Prof. Ireneusz Kamiński

Prof. Małgorzata Kossowska

Prof. Teresa Malecka

Rev. Prof. Andrzej Szostek

Prof. Wojciech Tygielski

Physical Sciences and Engineering (ST)

Prof. Zbigniew Błocki (until March 3)

Prof. Elżbieta Frąckowiak (until May 15)

Prof. Janusz Janeczek

Prof. Ryszard Kierzek (from June 11)

Prof. Henryk Kozłowski (chair of ST Committee)

Prof. Ewa Łokas

Prof. Michał Malinowski

Prof. Andrzej Sobolewski

Prof. Jacek Teichman-Konarzowski

Prof. Marek Żukowski

Life Sciences (NZ)

Prof. Jerzy Chudek

Prof. Artur Jarmołowski

Prof. Krzysztof Józwiak

Prof. Sergiusz Józwiak

Prof. Leszek Kaczmarek (chair of NZ Committee)

Prof. Jan Kotwica

Prof. Krzysztof Nowak

Prof. Maciej Wołowicz

Office

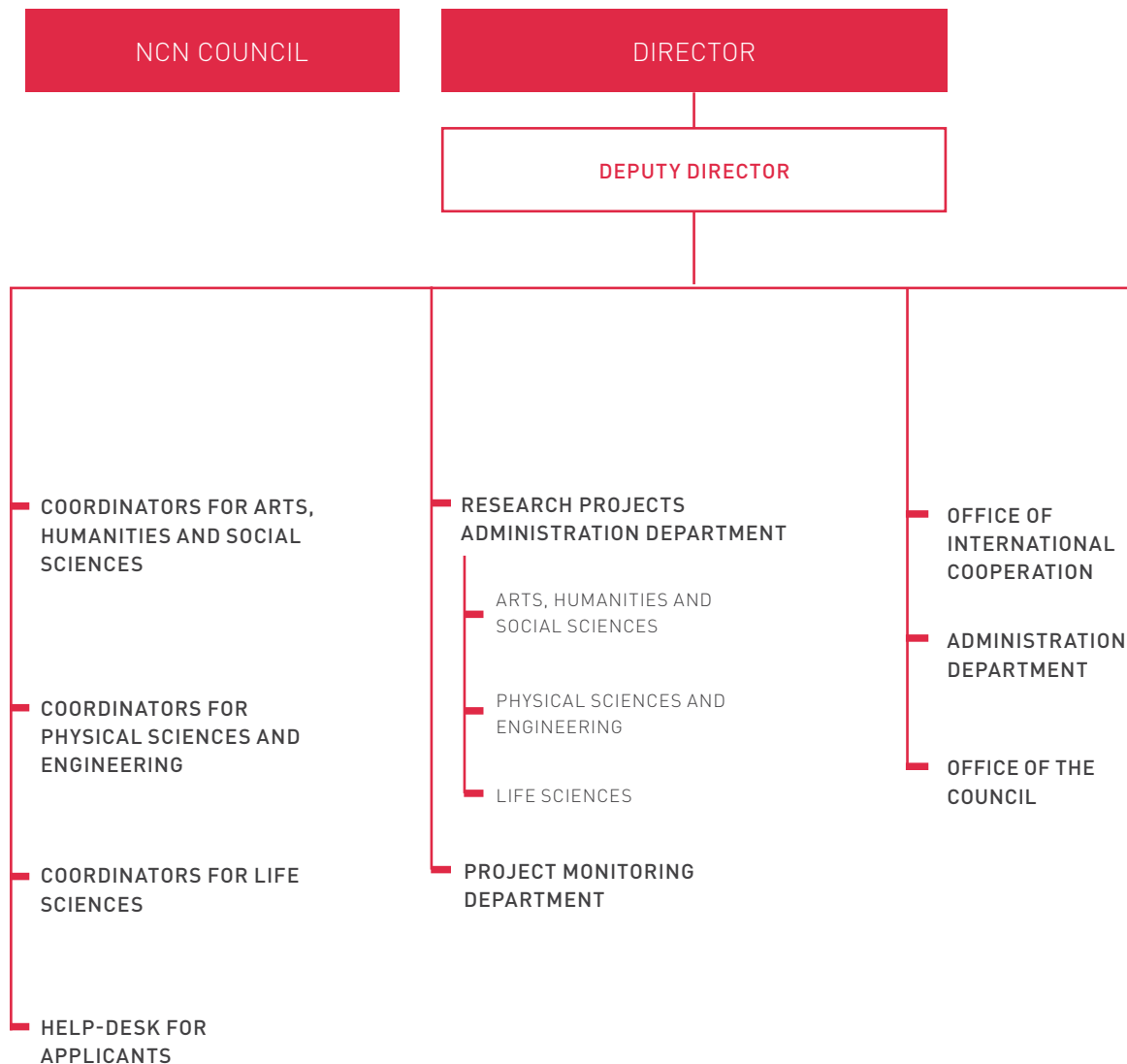
The NCN Office is an entity combining the efforts of a number of the NCN's departments and teams. On a day-to-day basis, the Office is responsible for processing calls for proposals and organising meetings for experts at the peer review evaluation stage. The Office also provides support to the applicants and answers their queries. Its major responsibilities also include administrative and financial management of grant agreements, fostering international cooperation and disseminating of information about NCN funding opportunities among researchers.

Coordinators

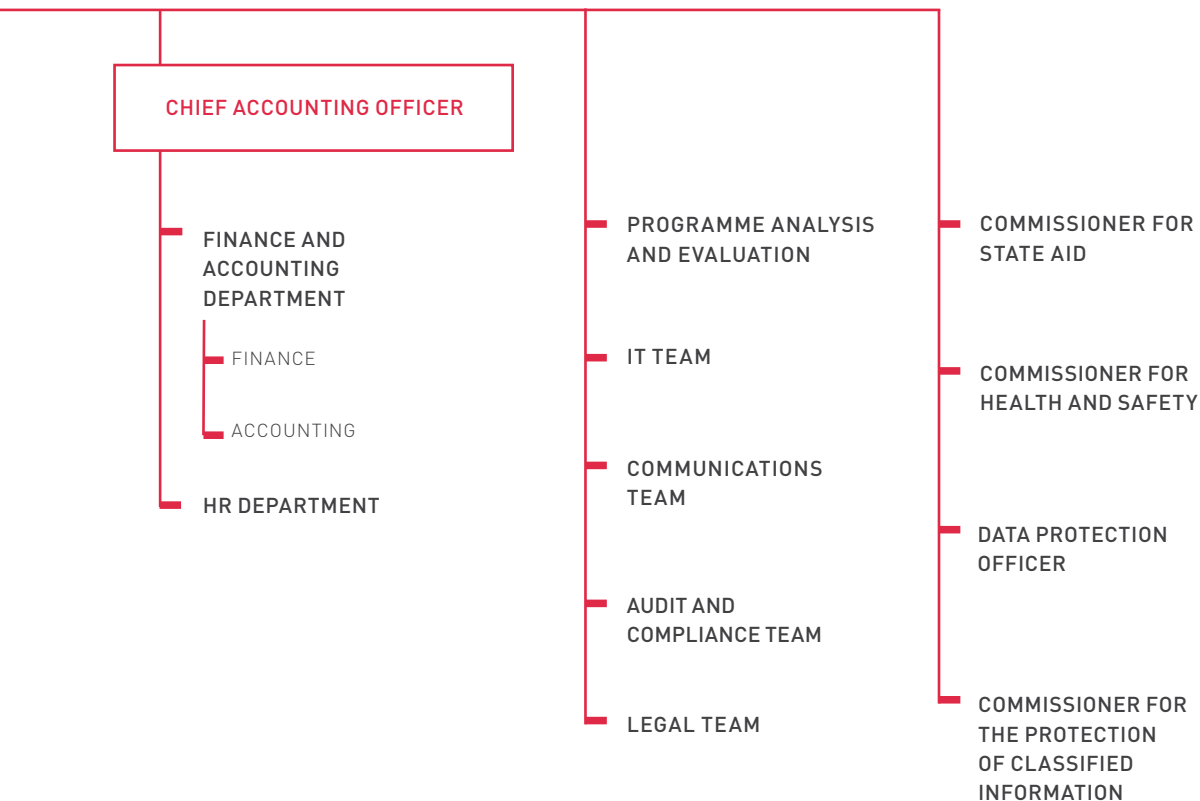
The NCN Coordinators are scientific officers responsible for organising and conducting calls for proposals for research projects. Their responsibilities also include evaluation of the impartiality of the peer review process, the eligibility check of proposals submitted within the calls, as well as the promotion of NCN funding programmes in the research community. Coordinators support the NCN Council in developing the research policy.

Coordinators work within the NCN in three units: Arts, Humanities and Social Sciences; Life Sciences and Physical Sciences and Engineering. They are selected by the NCN Council on the basis of competition. Candidates for this position must have at least a PhD.

NCN STRUCTURE



Structure*



* Organizational structure in force from 1 April 2016

EXECUTION OF NCN TASKS IN 2015

13



CALLS ANNOUNCED

8



INTERNATIONAL
CALLS ANNOUNCED

12



CONCLUDED CALLS

1.2^{BN} EUR



REQUESTED BY
APPLICANTS

2038



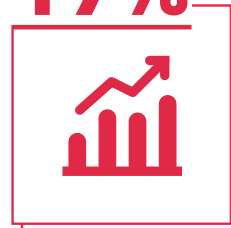
PROJECTS
RECOMMENDED
FOR FUNDING

229.5^M EUR



ALLOCATED FOR
RESEARCH PROJECTS
SELECTED WITHIN NCN
CALLS

19%



SUCCESS RATE

Funding schemes

The National Science Centre funds basic research in the form of research projects, doctoral scholarships and post-doctoral internships. Calls for proposals are announced every three months. The Centre offers 11 types of funding schemes taking into account the various needs of the research community, including researchers starting their career, as well as advanced researchers. In addition, the Centre together with its international partners launches international calls for proposals, such as BEETHOVEN, organised jointly with Deutsche Forschungsgemeinschaft (DFG).

NCN funding is distributed among the best research projects carried out by PIs and investigators with both an excellent scientific portfolio as well as the facilities necessary for project implementation. The NCN accepts proposals in all research disciplines included in the NCN panels.



PRELUDIUM

Call for research projects**Duration:** 12, 24 or 36 months**Funding:** ca. EUR 12 000, 24 000, 36 000 depending on the project's duration**Applicants:** individuals who do not hold a doctoral degree**Call for proposals:** twice a year

ETIUDA

Call for doctoral scholarships**Duration:** 6-12 months and a research stay of 3-6 months at a research centre outside of Poland**Funding:** ca. EUR 700 monthly for 6 to 12 months, and resources to cover the costs of travel and a research stay at a research centre outside of Poland**Applicants:** PhD candidates working on their PhD thesis**Other criteria:** the recipient of the scholarship must obtain his or her doctoral degree within 6-12 months of the scholarship paying period**Call for proposals:** once a year

SONATA

Call for research projects involving innovative basic research, using advanced research equipment and/or an original methodology**Duration:** 12, 24 or 36 months**Funding:** no cap on funding for an individual project**Applicants:** researchers with a doctoral degree obtained within seven years of submission of the proposal**Call for proposals:** twice a year

SONATA BIS

Call for research projects that include establishing new research teams**Duration:** 36, 48 or 60 months**Funding:** no cap on funding for an individual project**Applicants:** individuals with a doctoral degree obtained within 2-12 years of submission of the proposal**Call for proposals:** once a year



FUGA

Call for research internships in research institutions within Poland, this scheme aims to enhance mobility of Polish researchers

Duration: 12-36 months

Funding: ca. EUR 2 100 – 2 500 a month depending on the internship's duration and funding for research carried out by the awardee

Applicants: individuals beginning their careers in research, with a doctoral degree obtained within 7 years of submission of the proposal

Other criteria: the location of the planned internship cannot be the same as the one where the applicant is employed or was employed in the past two years, and – at the same time – cannot be in the same *województwo* (province) where the applicant is affiliated

Call for proposals: once a year



MAESTRO

A funding opportunity for advanced researchers wanting to conduct pioneering research, including interdisciplinary research, which is important for the development of science, surpasses the current state of knowledge, and may result in scientific discoveries

Duration: 36, 48 or 60 months

Applicants: advanced researchers (a doctoral degree is a prerequisite) who in a 10-year period have published at least 5 publications in renowned journals, have led at least two completed research projects that have been granted funding

Other criteria: at least one investigator with a doctorate and at least one doctoral candidate must be employed in the project

Call for proposals: once a year



SYMFONIA

A funding opportunity for established researchers, whose research stands out for its quality and crosses borders between research disciplines

Duration: 36, 48 or 60 months

Funding: min. EUR 470 500 for an individual project

Applicants: researchers holding a doctoral degree who in the 10 years before submission of the proposal had been a Principal Investigator of at least two completed research projects

Other criteria: considered will be projects that span at least two out of three research domains as defined by the NCN (Arts, Humanities and Social Sciences, Physical Sciences and Engineering, Life Sciences)

Call for proposals: once a year



OPUS

A funding opportunity for a wide range of applicants irrespective of their research experience, proposals may include the purchase or construction of research equipment

Duration: 12, 24 or 36 months

Funding: no cap on funding for an individual project

Applicants: all researchers, irrespective of their research experience

Call for proposals: twice a year



HARMONIA

A funding opportunity addressed to researchers who want to carry out research projects within international cooperation, not co-financed from international sources

Duration: 12, 24 or 36 months

Funding: up to ca. EUR 117 500, up to ca. EUR 235 000, up to ca. EUR 353 000 depending on the project's duration (only for the Polish research team)

Applicants: all researchers irrespective of their research experience

Call for proposals: once a year



TANGO

A funding scheme that enables scientists, engineers and scholars to turn their projects in basic research into solutions and products that may benefit society and economies in a direct way

Duration: the concept phase: 3-12 months, the research and development phase (R&D): up to 24 months

Funding: concept phase: up to ca. EUR 35 000, R&D: up to ca. EUR 235 000

Applicants: researchers who have acted as PIs or investigators in projects in basic research which show the promise of successful implementation



POLONEZ

A funding opportunity for incoming researchers willing to do research in Poland

Duration: 12 or 24 months

Applicants: researchers holding a doctoral degree or at least four years of full-time research experience, who in the period of 3 years preceding the call announcement have not resided or carried out their main activity (work, studies, etc.) in Poland for more than 12 months



HS – ARTS, HUMANITIES AND SOCIAL SCIENCES

- HS1** Fundamental questions of human existence and the nature of reality
- HS2** Cultures and cultural creativity
- HS3** The study of the human past
- HS4** Individuals, institutions and markets
- HS5** Social norms and governance
- HS6** Human nature and human society



NZ – LIFE SCIENCES

- NZ1** Molecular and Structural Biology and Biochemistry
- NZ2** Genetics, Genomics
- NZ3** Cellular and Developmental Biology
- NZ4** Biology of Tissues, Organs and Organisms
- NZ5** Human and Animal non-infectious diseases
- NZ6** Human and Animal immunology and infection
- NZ7** Public health
- NZ8** Evolutionary and environmental biology
- NZ9** Applied life sciences and biotechnology



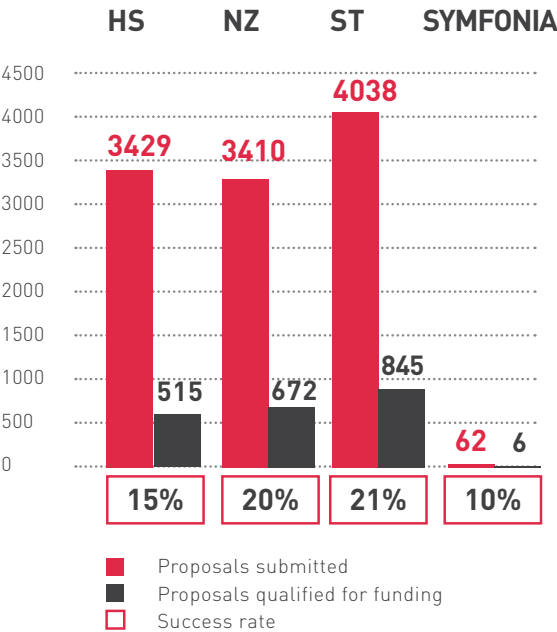
ST – PHYSICAL SCIENCES AND ENGINEERING

- ST1** Mathematics
- ST2** Fundamental constituents of matter
- ST3** Condensed matter physics
- ST4** Physical and Analytical Chemical sciences
- ST5** Materials and Synthesis
- ST6** Computer science and informatics
- ST7** Systems and telecommunications engineering
- ST8** Products and processes engineering
- ST9** Astronomy and space research
- ST10** Earth system science

Funding basic research

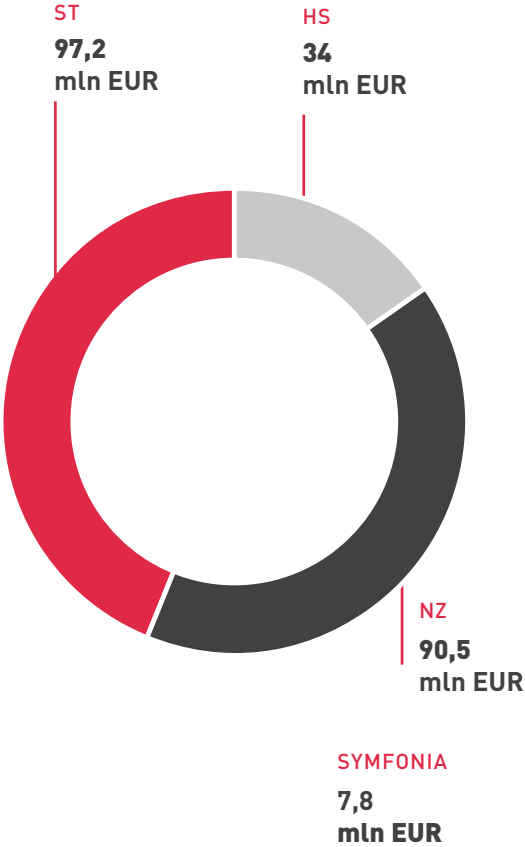
In calls for proposals concluded in 2015, 10 939 applications for a total over EUR 1 BN were submitted. 2 038 applications worth over EUR 229 M were qualified for funding.

Number of applications submitted and selected for funding in calls for proposals concluded in 2015 in particular research domains, along with the numerical success rate*



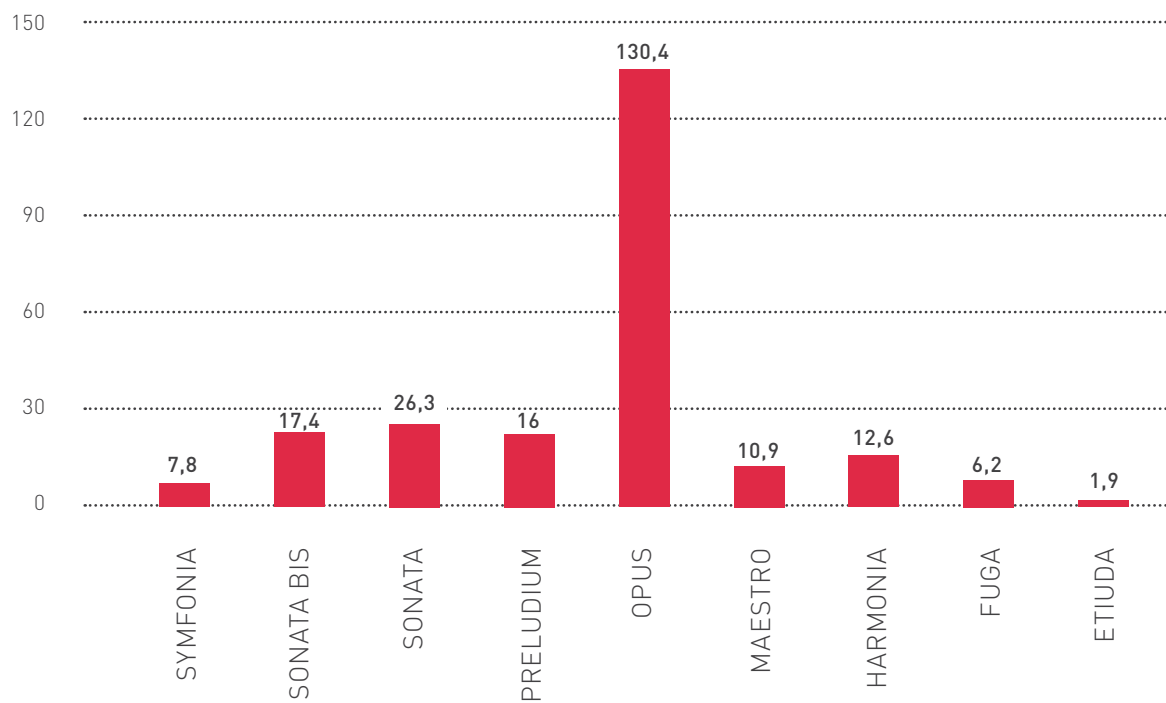
* The success rate is the percentage of applications that have received funding. It shows the ratio of proposals selected for funding to the proposals submitted.

Funding granted in 2015 with a breakdown into research domains**

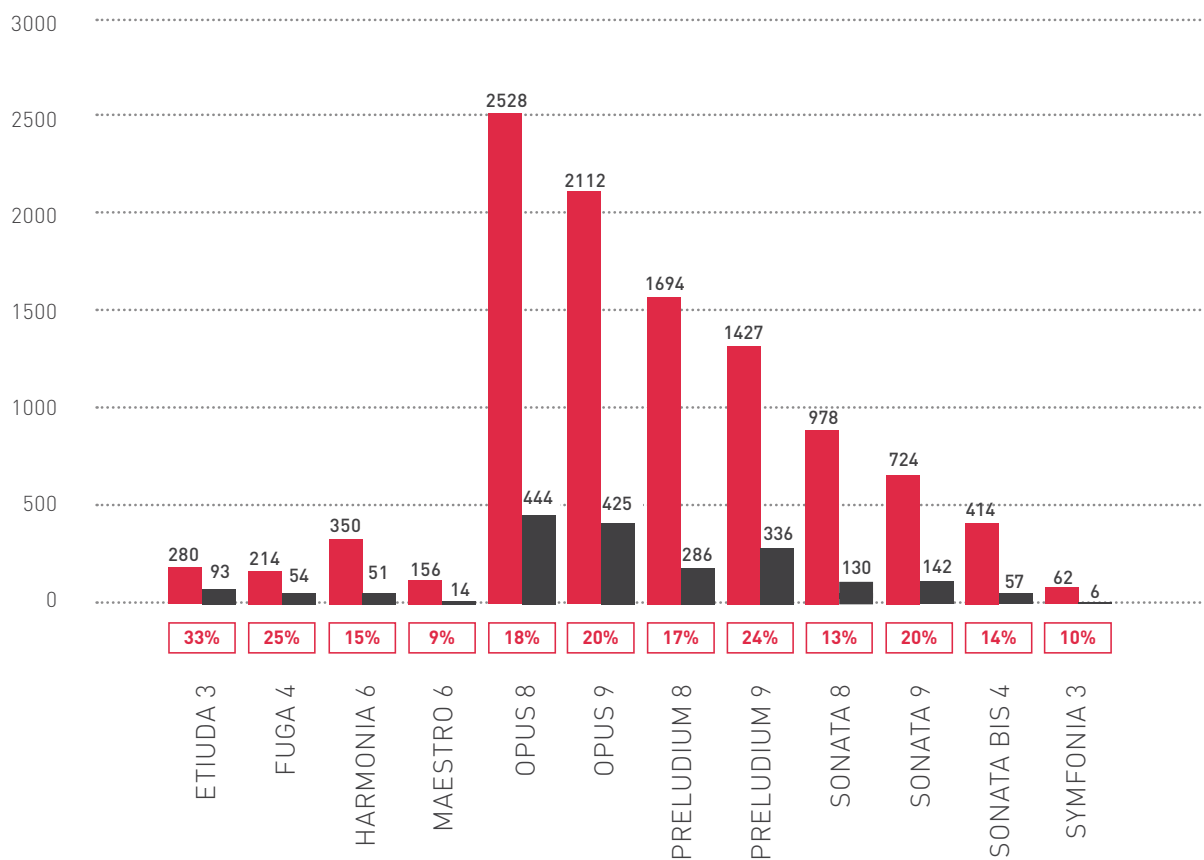


** This table does not include the TANGO funding scheme.

Funding granted within calls concluded in 2015 with a breakdown into types of funding schemes (in M EUR)



Number of proposals submitted and qualified for funding within calls concluded in 2015 with breakdown into types of funding schemes, along with the success rate*



*The success rate is the percentage of applications that have received funding. It shows the ratio of proposals selected for funding to the proposals submitted.

Best Performing Polish Host Institutions

A ranking of the highest NCN beneficiaries in 2015 included:

- public and private universities (**73%** of all beneficiaries),
- Polish Academy of Sciences (PAN) research institutions (**22%**),
- research institutes (**4%**).

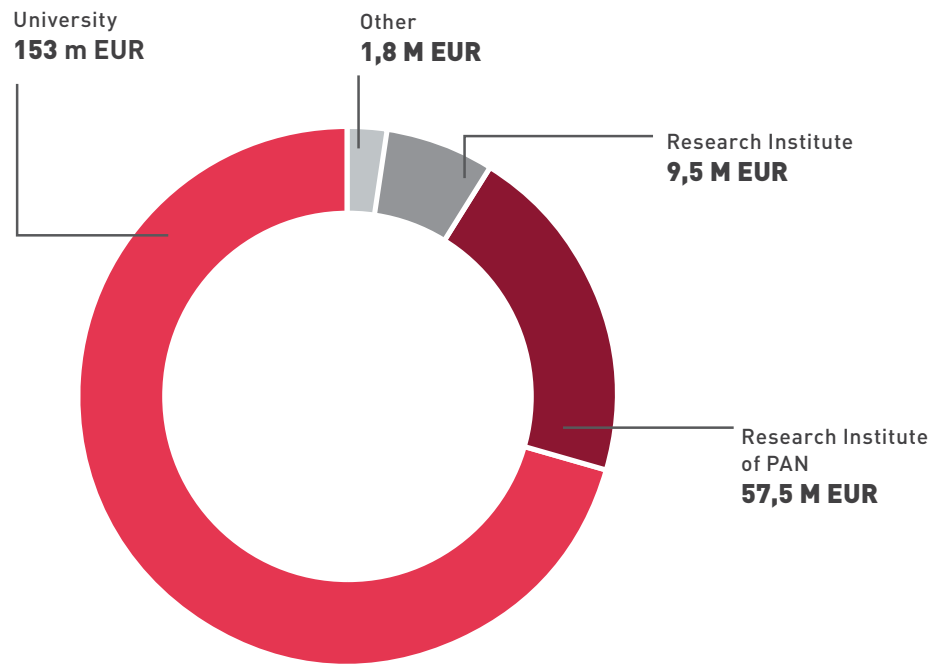
Host Institution	Funding granted in M EUR	Proposals qualified for funding	Success rate
University of Warsaw	26.13	232	28%
Jagiellonian University	21.58	200	24%
Adam Mickiewicz University in Poznań	9.58	127	22%
University of Wrocław	9.00	83	27%
Nencki Institute of Experimental Biology	7.66	43	41%
University of Gdańsk	7.38	56	22%
AGH University of Science and Technology	7.02	65	19%
Wrocław University of Technology	6.41	60	23%
Warsaw University of Technology	5.39	51	17%
Institute of Biochemistry and Biophysics, Polish Academy of Sciences	4.67	26	39%
Nicolaus Copernicus University of Toruń	4.52	48	18%
Lodz University of Technology	3.86	26	16%
Medical University of Lodz	3.65	28	19%
Gdańsk University of Technology	3.20	30	17%
Institute of Physical Chemistry, Polish Academy of Sciences	3.12	26	43%
University of Lodz	3.06	41	14%
University of Silesia in Katowice	3.06	35	19%
Institute of Physics, Polish Academy of Sciences	2.64	16	27%
Warsaw University of Life Sciences	2.60	13	11%
Institute of Bioorganic Chemistry, Polish Academy of Sciences	2.54	16	37%
Medical University of Gdańsk	2.52	18	18%

The table presents a ranking of institutions, which in 2015 received NCN funding of over EUR 2.39 M each. Once again, among the leaders are the University of Warsaw with 232 applications qualified for funding, and Jagiellonian University with 200 projects. Also, in terms of funding granted, first place belongs to the University of Warsaw, second to Jagiellonian University.

The success rate presented in the table is the ratio of the number of proposals selected for funding to the number

of applications submitted. The highest rate among beneficiaries, who in 2015 managed to get funding of more than EUR 2.39 M, was 43% – was obtained by the Institute of Physical Chemistry of the Polish Academy of Sciences. Second place (41%) was taken by Nencki Institute of Experimental Biology, while third place went to the Institute of Biochemistry and Biophysics with a score of 39%. Among the best universities was the University of Warsaw (28%), the University of Wrocław (27%) and Jagiellonian University (24%).

Chart 1. Funding granted to respective categories of beneficiaries in NCN calls concluded in 2015

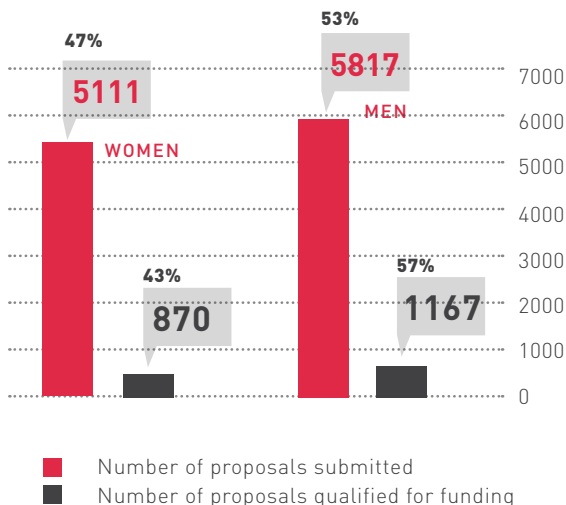


Principal Investigators*

In 2015 proposals submitted by women accounted for 47% of the total applications. Effectiveness in applying for grants was slightly lower among women than men; the success rate was 17% and 20% accordingly. 57% of projects awarded funding in 2015 were led by men, while 43% – by women.

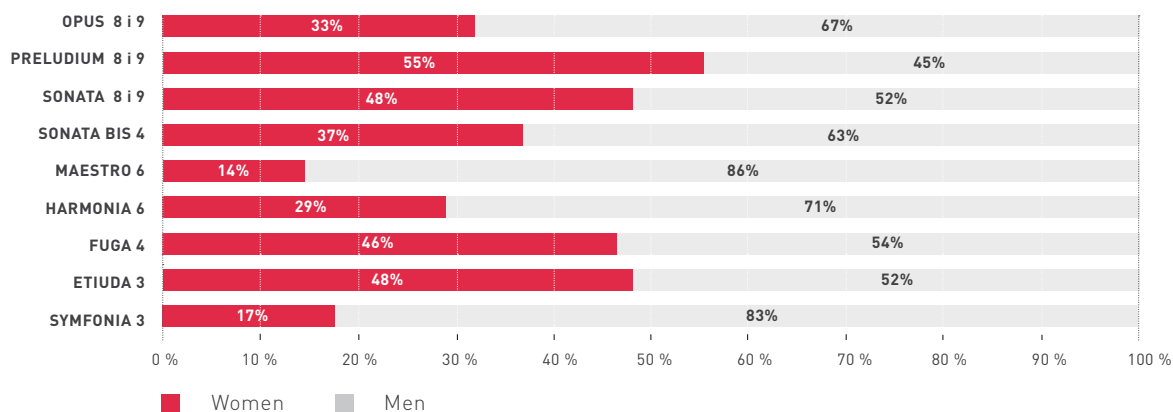
- The highest percentage of women among NCN awardees was found in the PRELUDIUM funding scheme. Women accounted for 55% of all grantees in the 8th and 9th edition of this programme.
- The lowest percentage of women Principal Investigators was observed on the MAESTRO 6 scheme, dedicated to advanced researchers, where there were only 2 projects, among 14 qualified for funding, led by women (Chart 2).

Number of applications submitted and qualified for funding with regard to the sex of the Principal Investigators*:



* The sex of Principal Investigators was determined on the basis of their PESEL number. The sex of PIs without a PESEL number was determined on the basis of their names. The analysis does not include applicants whose names did not indicate gender (these cases accounted for ca. 0.1%).

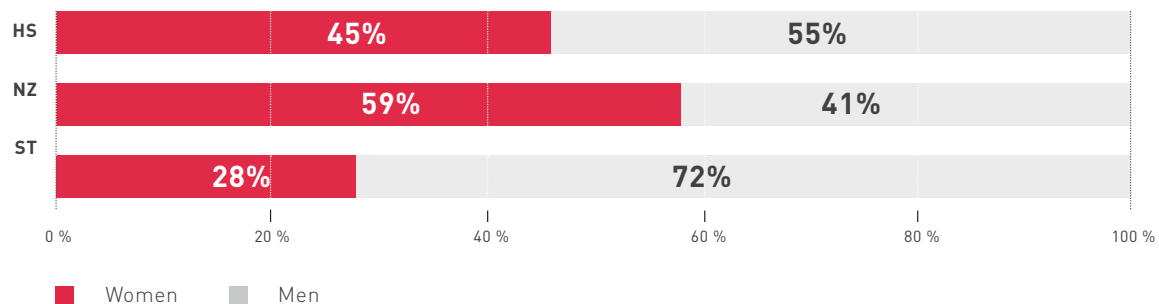
Chart 2. Share of women and men among NCN awardees in NCN calls concluded in 2015



Women and men awardees with breakdown into research domains

- Women dominate among awardees in Life Sciences: 59% of projects awarded within this research area are led by women.
- Among the awardees in Physical Sciences and Engineering less than 1/3 of the grantees are women (Chart 3).

Chart 3. Share of women and men in NCN calls concluded in 2014 with breakdown into research domains



Young researchers

One of NCN's goals is to support researchers starting their scientific career. For this group of researchers, the NCN allocates at least 20% of its funding. According to the Act on Principles of Funding Research young researchers are individuals under 35. In NCN calls concluded in 2015, this groups of scientists accounted for more than half of all grantees.

25%

of all funding spent by the NCN in calls concluded in 2015 was dedicated to financing research projects, scholarships and internships carried out by researchers about to embark on their career in research.

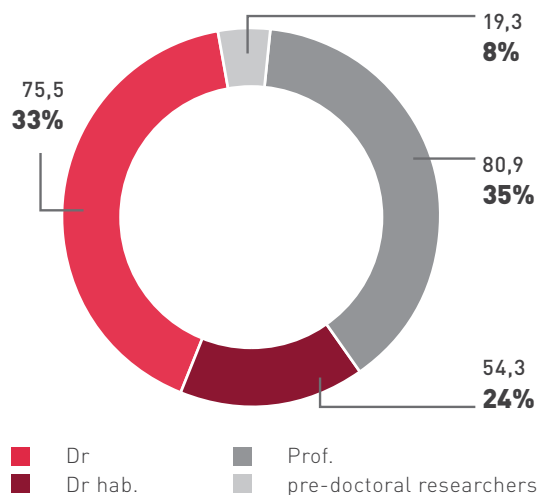
47,5%

of applications were submitted by researchers under 35, whereas 51.5% of proposals selected for funding were led by young researchers.

- The largest group of NCN grantees in calls concluded in 2015 are researchers at the onset of their career. Pre-doctoral scientists account for **64%** of the total number of grantees.
- This group of applicants received **41%** of the total funding awarded in 2015 (Chart 4)
- Researchers with a habilitation degree or title of professor account for **36%** of awardees in 2015 and received **59%** of the 2015 budget dedicated to research projects.

Chart 4. Share of researchers at different stages of their career with breakdown into the amount of funding granted in 2015

Amount of funding **M EUR**



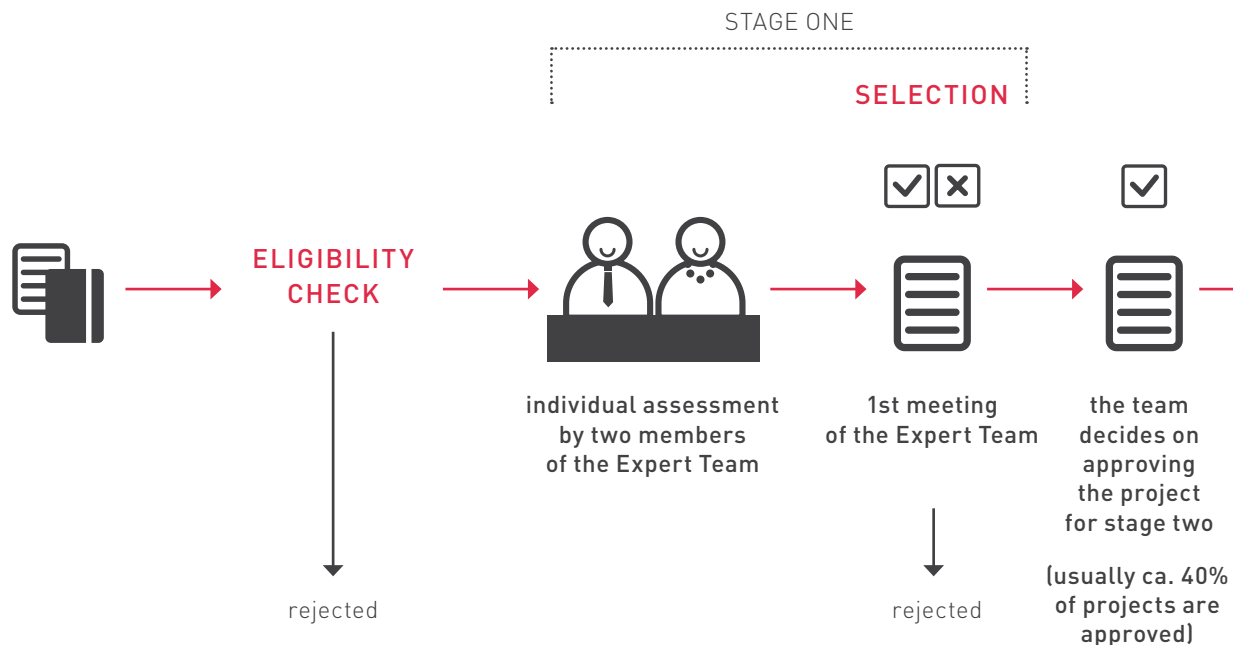
The proposal evaluation process

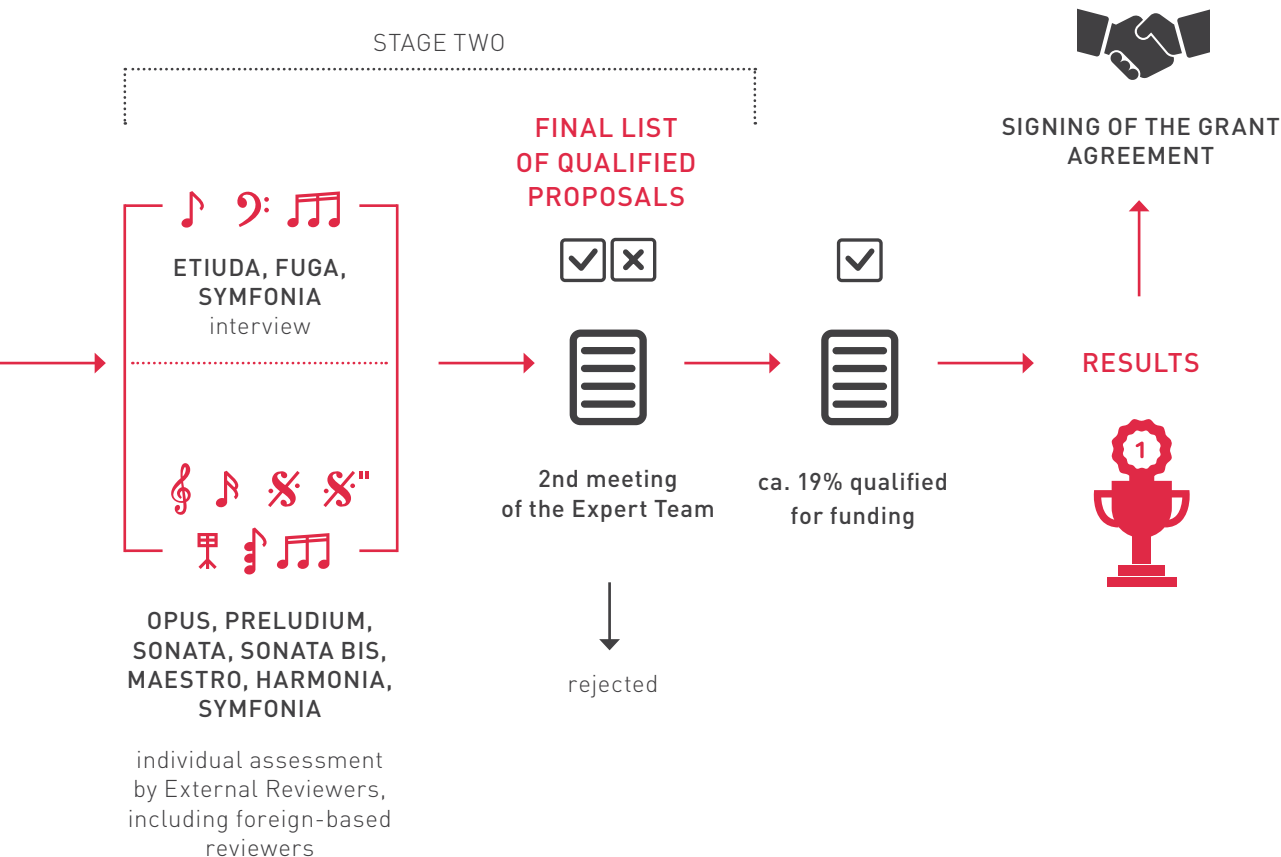
The NCN's priorities include funding excellent research projects, selected within a two-step peer review process. As a general rule, the NCN Council has adopted two main criteria – the excellence of the research projects and the research portfolio of the investigators. A merit-based evaluation of proposals is preceded by an eligibility check carried out by NCN Coordinators; they ensure that the applications are complete and fulfill all eligibility requirements. A merit-based assessment of the proposals is made by Expert Teams (group of experts selected by the NCN Council from among distinguished researchers, appointed by the NCN Director).

I STAGE – Applications are assessed by a member of the Expert Team individually. Their marks are a starting point for a discussion in the first expert panel meeting. Decisions concerning rejecting or qualifying a project to the second stage are made collectively by the Expert Team after discussion. The experts draw up a ranking list of proposals which could be invited to the second step of the evaluation.

II STAGE – Applications are evaluated by external reviewers, including international researchers, and then the proposals are discussed by the Expert Team in the second panel meeting. External reviewers are selected by NCN Coordinators who take into consideration candidates indicated by the Expert Team. Final scores and the ranking list are set up by the Expert Team. In some funding schemes at the II stage an interview with applicants is also organised.

THE PROPOSAL EVALUATION





Experts

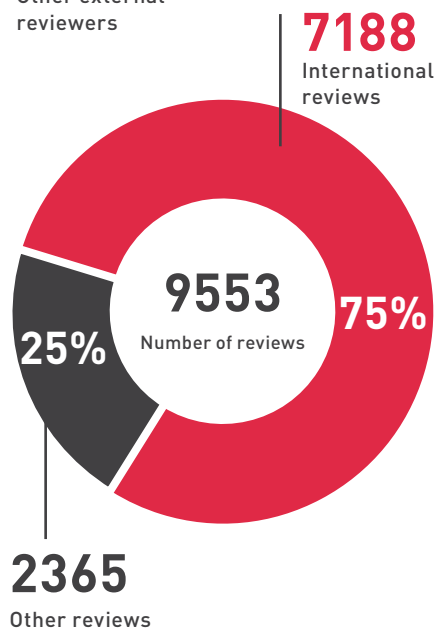
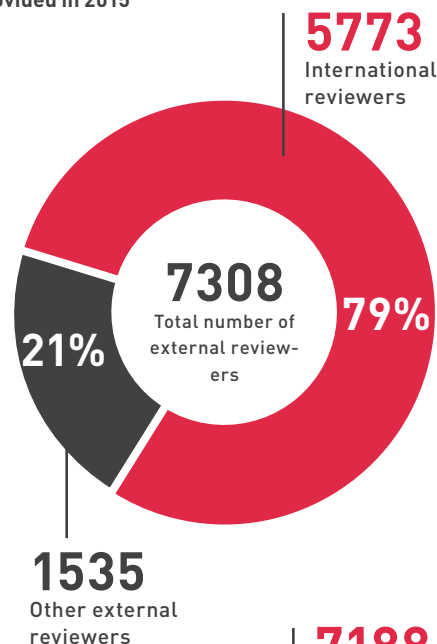
In 2015, the NCN appointed 1253 experts who worked in 92 Expert Teams. The applications were assessed in 3 research domains: HS – by 28 Expert Teams, NZ – 35 Expert Teams, ST – 28 Expert Teams, and one interdisciplinary team appointed to evaluate proposals in SYMFONIA funding schemes.

Number of Experts with breakdown into research domains:

-  **HS** – 290 Experts
-  **NZ** – 303 Experts
-  **ST** – 377 Experts
-  **SYMFONIA** – 15 Experts

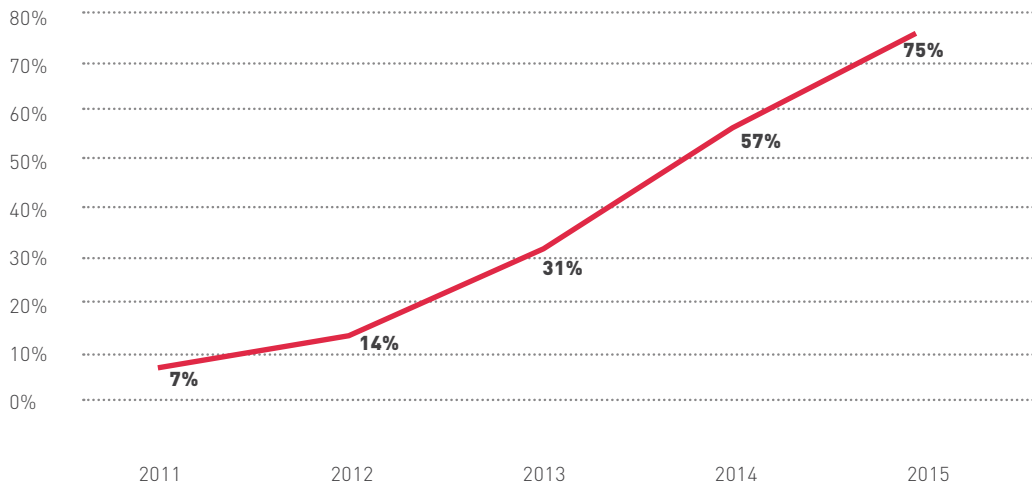
In the second stage 7308 external reviewers were involved who provided 9553 reviews. 79% of external reviewers were international experts, who prepared 7188 reviews, which accounts for 75% of all assessments.

Number of external reviewers and number of reviews provided in 2015



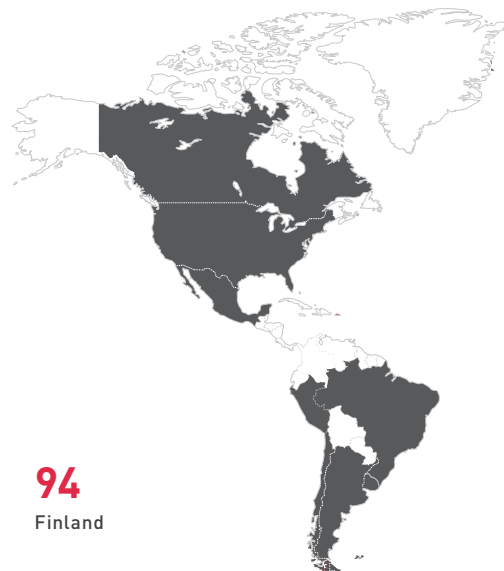
International reviewers

Chart 1: Percentage of international reviews in 2011-2015



Source: Programme Analysis and Evaluation and NCN Coordinators, based on data from the OSF submission system

International Reviewers

**1326**

United States of America

166

China

815

United Kingdom

166

The Netherlands

715

Germany

155

Belgium

94

Finland

83

Greece

463

Italy

147

India

74

Denmark

46

Israel

439

France

144

Portugal

72

Hong Kong

45

Slovakia

385

Spain

124

Austria

69

Brazil

43

Norway

240

Canada

108

Sweden

63

Hungary

40

Turkey

180

Australia

98

Japan

58

Russia

39

Ukraine

166

Czech Republic

95

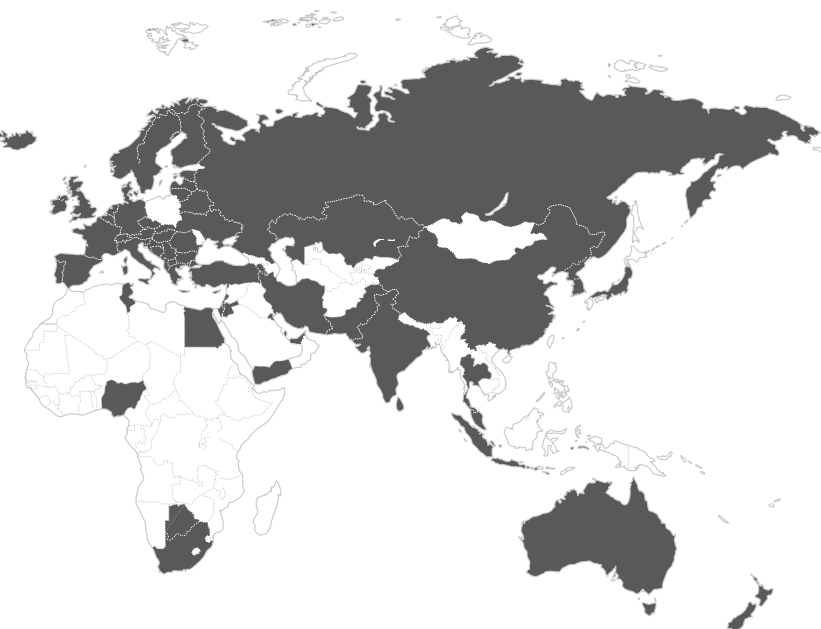
Switzerland

52

Ireland

31

Singapore



29

New Zealand

24

Taiwan

23

Romania

22

Korea

20

Serbia

20

Argentina

19

Estonia

19

Bulgaria

19

Lithuania

18

Mexico

18

Slovenia

17

Pakistan

15

Republic of South Africa

14

Croatia

13

Malaysia

13

Chile

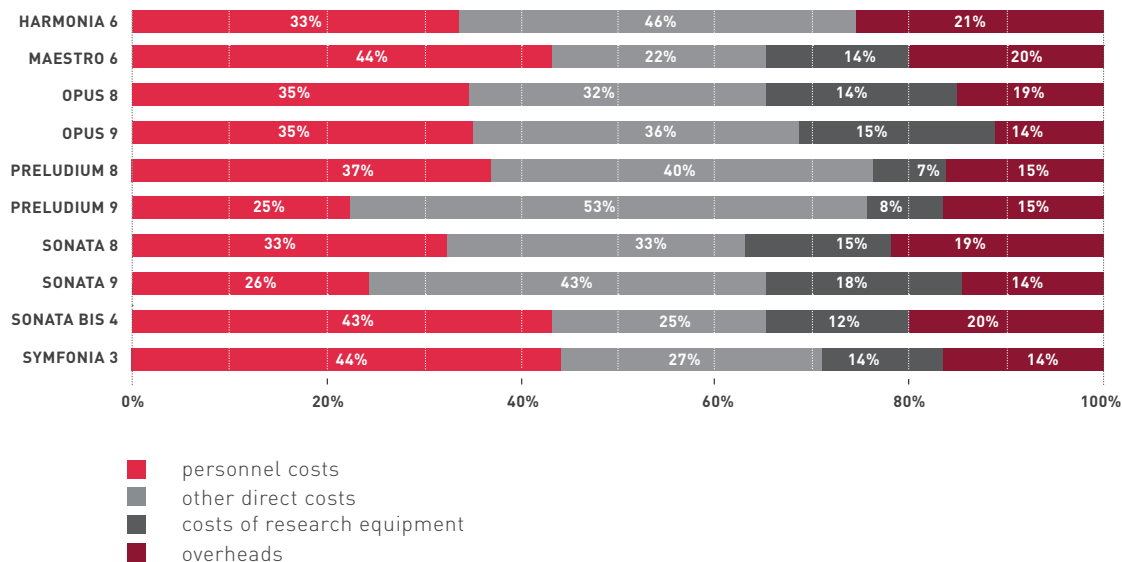
Latvia	9
Egypt	8
Luxembourg	8
Saudi Arabia	8
Iceland	7
Thailand	6
Iran (Islamic Republic)	5
Cyprus	5
Peru	4
United Arab Emirates	4
Uruguay	3
Sri Lanka	2
Qatar	2
Armenia	2
Lebanon	2
Monaco	1
Tunisia	1
Nigeria	1
Puerto Rico	1
Belarus	1
Botswana	1
Yemen	1
Reunion	1
Jordan	1
Macedonia	1
Macau	1
Bosnia and Herzegovina	1
Kuwait	1

EXPERTS

Costs in NCN grants

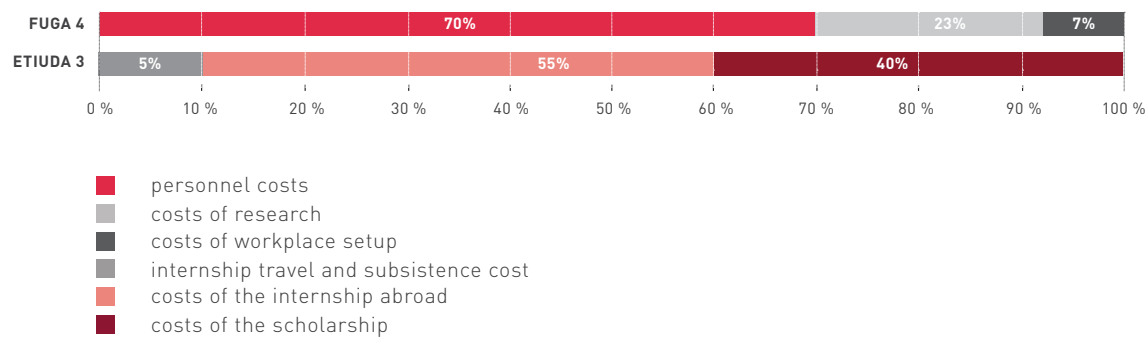
The amount of funding granted may be spent on different cost categories, including personnel costs, which consume on average 35% of the total project budget (excluding FUGA and ETIUDA).

Chart 4. Amount of funding and share of cost categories in NCN calls concluded in 2015 (excluding ETIUDA 3 and FUGA 4)



Due to the nature of the FUGA and ETIUDA calls, the share of cost categories look different than in other schemes. In FUGA, the biggest share of funds is spent on personnel costs (70%), whereas in ETIUDA the largest amount falls on internship in the Host Institution abroad (50%) and the scholarship received by the grantee (40%).

Chart 5. Amount of funding and share of cost categories in FUGA 4 and ETIUDA 3 concluded in 2015



Appeal Committee

Applicants may appeal against a decision that refuses to award funds to a project within 14 days from the date of receipt of the decision. The appeals are considered by the Appeal Committee of the NCN Council.

In 2015 the Committee:

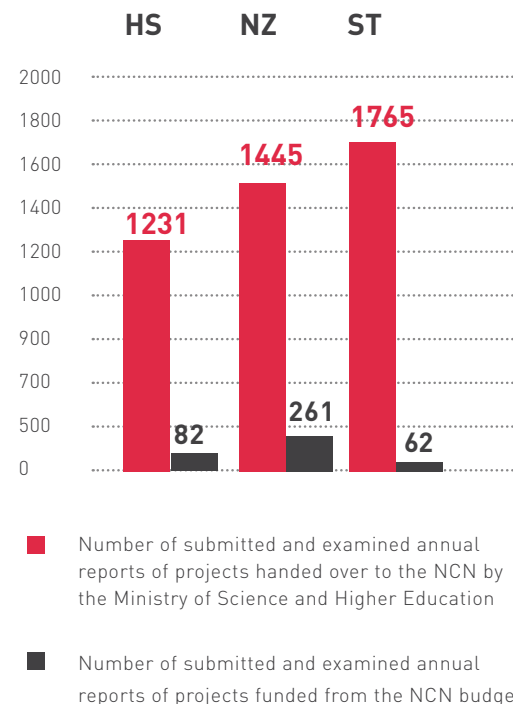
- Considered **423** appeals
- Allocated EUR **2 030 468** to **16** projects.
- Commissioned **35** additional reviews.
- In **5** cases annulled the director's decision and applications were re-evaluated.

Monitoring of Project Implementation

Host Institutions together with a project's Principal Investigators are responsible for submitting annual, mid-term, as well as final reports to the NCN. Annual reports should be submitted with a deadline of March 31st one year after the start of the project, but not earlier than 8 months after the project starts. A mid-term report should be sent to the NCN 30 months after the project has started. Mid-term reports are only required within the SONATA 1-4, SONATA BIS 1-3, MAESTRO 1-5 and SYMFONIA 1-2 calls for proposals, if the project is longer than 36 months. Based on the assessment of the reports, the project will receive funding for the second part of its realisation.

In 2015, project monitoring included the assessment of annual and final reports of projects handed over to the NCN by the Ministry of Science and Higher Education, as well as annual and mid-term reports of projects funded from the NCN budget.

Table 3. Number of proposals submitted and examined by the National Science Centre in 2015



Source: NCN Research Project Administration Department

International Cooperation

One of the NCN’s priorities is fostering research carried out by Polish researchers in international cooperation. To enable Polish research teams to have a fluid exchange of ideas with international partners, NCN participates in networks such as ERA-NETs and JPIs (Joint Pro

gramming Initiatives). These networks, composed of research funding organisations, launch common calls for proposals carried out jointly by scientists from various countries. The NCN also initiates bilateral cooperation with its partner institutions.

Table 4. International cooperation in 2015

Programme	Research Area
HERA	Humanities
NORFACE	Social Sciences
BEETHOVEN	Humanities and Social Sciences
ERA-NET Urban Europe	Urban Studies
Infect-ERA	Infectious Diseases
BiodivERsA	Biodiversity
JPI-EC-AMR	Antimicrobial Resistance
JPI HDHL	Healthy Diet
CHIST-ERA	Information and Communication Science and Technology
M-ERA.NET	Materials Science and Engineering
Quant-ERA	Quantum Technologies

Source: Office of International Cooperation



HS – ARTS, HUMANITIES AND SOCIAL SCIENCES

HERA Since 2012 the NCN has been a partner of the HERA network which supports research in the humanities. HERA strives to foster international cooperation among researchers from different European research performing organisations and answer the social, cultural and political challenges of today's Europe. In January 2015 the network launched a new call for proposals on Uses of the Past. Within this funding opportunity, 605 international proposals, 137 including a Polish research team, were submitted. A hundred of these applications, 22 with the participation of researchers from Poland, were invited to the second stage.

In November 2015 the NCN Coordinator in Arts, Humanities and Social Sciences was elected the HERA Network Chair. His role is to lead the network's strategy, facilitate agreements on positions and strategies for HERA, and represent these on behalf of the network to the research community, stakeholders, policy-makers and the wider public.

NORFACE is a consortium of research funding organisations which supports research in the area of social sciences through financing international research projects. In December 2015 the network pre-announced a new call for research proposals, to be launched in January 2016, on *Dynamics of Inequalities across the Life-course*.

ERA-NET Smart Urban Futures is an initiative created by JPI Urban Europe. It includes partners from 18 European countries whose aim is to finance international, interdisciplinary research projects that respond to the challenges of modern cities and urban areas. The network supports research involving researchers, as well as innovators, practitioners, representatives of civil society, NGOs, municipalities, urban utilities and other stakeholders. In December 2015, the NCN, together with the ENSUF network, announced a new funding initiative targeting the following topics:

- *Concepts and strategies for smart urban transformation, growth and shrinkage,*
- *New dynamics of public services,*
- *Inclusive, vibrant and accessible urban communities.*

BEETHOVEN is a funding opportunity carried out jointly by the NCN and Deutsche Forschungsgemeinschaft (DFG), an organisation funding research in Germany. Within a pilot call for Polish-German research projects in Humanities and Social Sciences launched in September 2015, 17 projects were selected for funding. In 2015 both agencies started preparations for a new call covering research fields such as mathematics, physics, chemistry and astronomy, to be launched in the autumn of 2016.



NZ – LIFE SCIENCES

In 2015 the National Science Centre launched three international funding opportunities in Life Sciences. Together with the Infect-ERA consortium supporting research in infectious diseases, the NCN launched a call for proposals in the following topics:

- *The host-pathogen interaction in regards to clinically relevant clones and the assessment of factors influencing this interplay (such as the microbiome e.g.)*
- *Detection, characterization and treatment in the individualized infection including development of markers for a clinical and personalized setting.*

Polish researchers also had an opportunity to apply for grants within the BiodivERsA call for proposals. The BiodivERsA network finances research in conservation and sustainable management of biodiversity. The call, launched in May 2015, targeted the following research subjects:

- *Understanding and managing the biodiversity dynamics of soils and sediments to improve ecosystem functioning and delivery of ecosystem services*
- *Understanding and managing biodiversity dynamics in land-, river- and sea-scapes (habitat connectivity, green and blue infrastructures, and naturing cities) to improve ecosystem functioning and delivery of ecosystem services.*

The National Science Centre also joined the JPI HDHL network and together with international partners announced a call for research projects on Nutrition and cognitive function. Within this programme the project SELENIUS Selenium in early life to enhance neurodevelopment in unfavourable settings, involving a Polish research team led by Dr hab. Kinga Polańska from the Nofer Institute of Occupational Medicine in Lodz, received a grant. Thanks to this funding, researchers from France, Germany, Italy, Poland and the UK will investigate the effect of selenium (Se) levels in fetal life on neurobehavioral development.

In 2015 the Centre became a partner of the JPI-EC-AMR initiative, implemented by JPI AMR (Joint Programming Initiative on Antimicrobial Resistance), which supports projects on antimicrobial resistance carried out by international research teams. In December the network pre-announced a call for proposals on the following topic: *To unravel the dynamics of transmission and selection of antimicrobial resistance (AMR) at genetic, bacterial, animal, human, societal, and environmental levels, in order to design and evaluate preventive and intervening measures for controlling resistance.*

ST – PHYSICAL SCIENCES AND ENGINEERING

CHIST-ERA In 2015 the NCN together with the CHIST-ERA network concluded a call in Information and Communication Technologies focused on the following topics: Resilient trustworthy cyber-physical systems (RTCPS); Human language understanding: Grounding language learning (HLU). As a result, the project Access multilingual information opinions involving a Polish team led by Dr Mikołaj Leszczuk from AGH University of Science and Technology was awarded funding. Scientists from France, Poland and Spain will help us understand broadcasting news presented in a foreign language and compare this news to a corresponding one in the user's mother tongue.

In September CHIST-ERA also launched a new funding initiative in the following research topics:

- *User-Centric Security, Privacy and Trust in the Internet of Things (SPTIoT)*
- *Terahertz Band for Next-Generation Mobile Communication Systems (TMCS).*

M-ERA.NET The NCN is a partner of the M-ERA.NET consortium whose aim is to support research projects in material science and engineering. In 2015 the network worked on a new call, to be opened in March 2016, focusing on the following research areas:

- *Integrated computational materials engineering;*
- *Innovative surfaces, coatings and interfaces;*
- *High performance synthetic and biobased composites;*
- *Functional materials;*
- *Interfaces between materials and biological hosts for health applications;*
- *Materials for additive manufacturing.*

OTHER INITIATIVES

QuantERA (ERA-NET Cofund on Quantum Technologies) In 2015, the NCN coordinated work on the QuantERA initiative. The aim of this programme is to foster synergy between different stakeholders in the area of Quantum Technologies and to create collaboration among the best groups of researchers in Europe. One of QuantERA's goals is to open a call for international projects in Quantum Technologies. To date, research funding organisations from 21 European countries have joined this initiative. On the 14th of October QuantERA was included in the Horizon 2020 Work Programme 2016-2017 (Future and Emerging Technologies – FET) with a budget of EUR 10 M. QuantERA partners have started working on developing a working programme for future actions, which will be included in an application to be submitted to the European Commission in 2016.

PIRE The NCN has initiated talks with the National Science Foundation about joining the PIRE initiative (Partnerships for International Research and Education). This programme supports international activities across all NSF supported disciplines. The primary goal of PIRE is to support high quality projects in which advances in research and education could not occur without international collaboration.

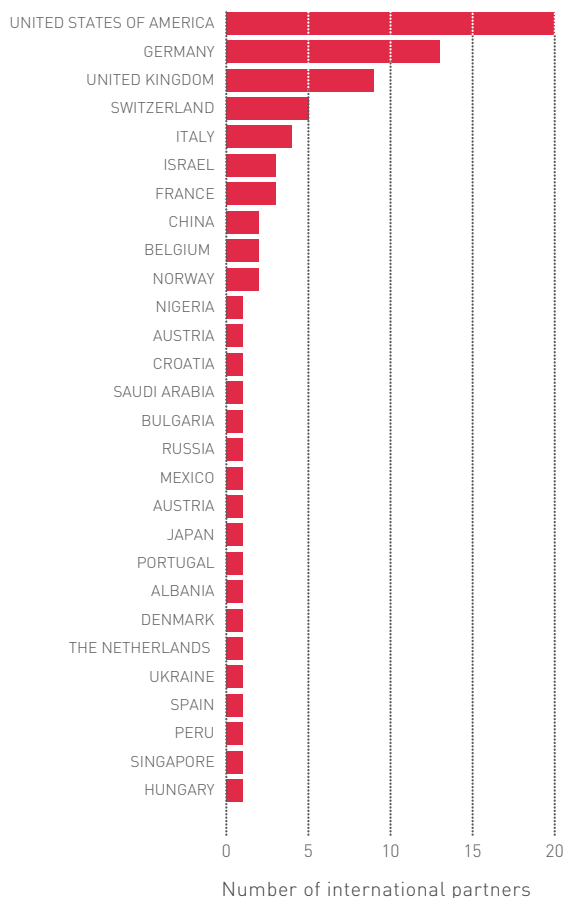
POLONEZ In February 2015, POLONEZ, a programme targeted at incoming researchers wanting to do research in Poland, was awarded funding of nearly EUR 6 M by the European Commission within the Marie Skłodowska-Curie Cofund. The first POLONEZ call for projects involving basic research was announced on the 15th of September. Under this funding opportunity

the NCN received 452 applications – 197 in Physical Sciences and Engineering, 138 in Arts, Humanities and Social Sciences and 117 in Life Sciences. The next edition of POLONEZ will be launched in March and September 2016.

In 2015 the NCN concluded the HARMONIA 6 call for proposals carried out in international cooperation. In this call, 51 research projects worth PLN 52.7 M were

granted funding. The success rate in this call was 15%. When taking into consideration the countries represented by international partners, the biggest number of projects were carried out in cooperation with the United States, Germany and the United Kingdom. However, it must be emphasised that there might be more than one international partner involved in each HARMONIA project (Chart 7).




Chart 6. Countries represented in projects awarded within HARMONIA 6



Events

The NCN Award

On the 7th of October the NCN Award was granted for the third time. It was awarded in three categories:

-  Arts, Humanities and Social Sciences
-  Physical Sciences and Engineering
-  Life Sciences

The NCN Award is conferred for notable achievements in basic research carried out in a Polish research institution. The laureates receive an award of EUR 12 000 each, which is funded by enterprises involved in supporting research.

In 2015 the award in Arts, Humanities and Social Sciences went to Prof. Michał Bilewicz from the Faculty of Psychology of the University of Warsaw for presenting a 3-factor structure of contemporary anti-semitism and its psychological consequences. This award was funded by FBN Poland consisting of the following companies: Colian, Enel-Med, Grupa Bemo Motors, Nowy Styl, Netbox PL and Yes.

Dr hab. Wiesław Babik from Jagiellonian University received an award in the field of Life Sciences for his research on animal adaptive evolution with a special focus on MHC genes. His award was sponsored by Celon Pharma.

In the field of Physical Sciences and Engineering, the award was granted to Prof. Piotr Śniady affiliated at Adam Mickiewicz University in Poznań and the Polish Academy of Sciences. Prof. Śniady was awarded for notable achievements in research in the representation theory and noncommutative probability theory.

NCN Open Days

The NCN Open Days is a yearly event organised in a different academic centre in Poland. It gives both the scientific community and the administrative staff of Polish research organisations an opportunity to meet with NCN employees, ask questions about NCN calls for proposals and project support, and to contribute to a wider debate on the research funding system in Poland.

On May 13-14, Szczecin hosted the third edition of the NCN Open Days. This event was co-organised by the Pomeranian Medical University in Szczecin, the West Pomeranian University of Technology, the Art Academy of Szczecin and Koszalin University of Technology. This event was held under the auspices of The Ministry of Science and Higher Education.

The NCN Open Days were opened by a press conference and a meeting of the NCN Council; this was followed by a presentation of research projects by NCN awardees. The NCN Open Days also held meetings for potential applicants and representatives of Host Institutions regarding the application process as well and project monitoring.

NCN Budget and accounts

The NCN budget in 2015 amounted to ca. EUR 219.2 M, of which ca. EUR 208.6 M was dedicated to funding of research projects (grant subsidy). The budget for operating expenses was EUR 9.7 M, whereas the investment subsidy amounted to EUR 0.83 M. In 2015 the NCN drew on 99,91% of the grant subsidy. To cover the costs of operating expenses, the NCN used 70.47% of the budget granted for this purpose. In addition, 8.84% of the investment subsidy was spent

Table 5. NCN Budget in 2015 (in thousands EUR)

Subsidies	Financial plan in 2015	Spent	Execution of the financial plan*
TOTAL	221 264	215 399	97,35%
Operating expenses	9 664	6 810	70,47%
Grant subsidy	208 656	208 479	99,91%
Investment Subsidy	845	74	8,84%
Resources received from the EU	2 097	34	1,67%

* execution of the financial plan in % calculated on the basis of non-rounded numbers

Table 6. Grant subsidy in 2015 [in thousands EUR]

Execution of finances broken down into types of funding schemes	
OPUS	102 748
PRELUDIUM	15 032
SONATA	25 679
SONATA BIS	12 981
HARMONIA	15 899
MAESTRO	22 888
FUGA	4 779
ETIUDA	1 925
SYMFONIA	5 892
ASPERA	89
NORFACE	75
JPND II	66
JPI CULTURAL HERIGATE	71
CHIST-ERA	76
CHIST-ERA II	13
BEETHOVEN	19
Membership Fees	21
Non co-financed research projects	225

In 2015 the NCN allocated over EUR 209 M for supporting basic research. Within its calls for proposals, the Centre spent ca. EUR 208 M for research projects. For programmes dedicated to supporting research in international cooperation, the NCN allocated EUR 0.42 M.

10 939



PROPOSALS
SUBMITTED

2 038



GRANTS AWARDED

209 M EUR



ALLOCATED FOR
RESEARCH PROJECTS

6,8 M EUR



OPERATIONS OF THE
NCN OFFICE (IN-
CLUDING PROPOSAL
EVALUATION COSTS

124



NUMBER OF
EMPLOYEES

1,8 M EUR



NCN STAFF
REMUNERATION

RESEARCH STORIES



OPUS 5

Call concluded on the 8th November 2013
NCN Panel: ST 10

Effects of a meteorite impact in
unconsolidated sediments – the case
of the iron meteorite shower
in “Morasko”, Poland

Dr hab. Witold Szczuciński
Adam Mickiewicz University in Poznań

Meteorite falls (known as impacts), leaving visible evidence in the form of impact craters, is one of the most common geological processes in the Solar System. For Earth they are, however, rare and brief phenomena and they therefore escape direct observation or measurement. The only way to have an insight into the processes and acting forces, is thus to study the indirect evidence (e.g. craters) and to use numerical modelling.

The largest known iron meteorite shower in Central Europe took place around 5,000 to 6,000 years ago in the region of what is today Morasko, on the outskirts of Poznań. The event is documented by hundreds of iron meteorite pieces and a number of related craters. So far studies focused on the meteorites' properties and on attempts to determine whether the depressions found in the area were caused by the impact event or have their origin in the last glacial period. The aim of the project is to contribute to current knowledge with a reconstruction of the processes which took place at the time of the impact and to determine its effects on the natural environment. We hope to precisely assess the time of the impact, the dispersal pattern and properties of the sediments ejected from the craters, the amount of released energy, the environmental consequences (e.g. fires, earthquakes) and their range as well as their potential consequences for the local human settlements at that time. In the long run, the aim is to use the new results to improve the numerical models, which allow for determining, among others, the effects of the meteorite impacts in unconsolidated sediments. Such models may serve as a basis for predicting similar future events.

In order to carry out a comprehensive study of the meteorite impact effects, one needs to apply a range of different research methods: mineralogical, geochemical, sedimentological, geophysical, micropaleontological, archaeological and numerical modelling. The research in the region of the craters involves developing a model of the terrain, investigating the sediments and searching for mineralogical evidence of the pressure and temperature during the impact. Studies of the environmental effects are based mainly on sediment cores from local lakes and peatlands. In those cores, thanks to sedimentological, geochemical and biological indicators (such as pollen), we can recover the age, range, durability and sustainability of the impact's effects on the

environment. Such a multi-faceted approach to the problem is possible thanks to the selection of a diverse group of experts. The project brings together researchers from Adam Mickiewicz University in Poznań and the Leibniz Institute for Research on Evolution and Biodiversity in Berlin, combining their efforts with those of researchers from Russia, USA and the Netherlands. Alongside the Principal Investigator, those responsible for the chief research tasks in the project are Prof. Andrzej Muszyński, Prof. Mirosław Makohonienko, and Dr Kai Wünneman.

Dr hab. Witold Szczuciński

Geologist at the Institute of Geology, Adam Mickiewicz university in Poznań. A member of the Polish Young Academy. His research focuses on sediments which are an archive of the history of the Earth. His special interest is quantitative approaches to contemporary sedimentary processes and the record of environmental changes in them, in particular those related to natural disasters (tsunamis, storms, floods, meteorite impacts, glaciers etc.). He carries out his research both on land and at sea – mainly in the Arctic, eastern Asia and Poland.

Project's webpage:

<http://moraskoproject.home.amu.edu.pl/>



SONATA BIS 3

Call concluded on the 23rd January 2014
NCN Panel: HS 3

Archaeological revival of the memory of the great war. Material remains of life and death in the trenches of the eastern front and the condition of the ever-changing battlescape in the Rawka and Bzura region (1914-2014).

Dr hab. Anna Zalewska

Institute of Archeology and Ethnology,
Polish Academy of Sciences

"Commemorating in places of memory is an act grounded in the conviction, shared by a community, that the *historical moment* being evoked is both significant and morally marked. Places of memory bring this tradition to life," says Jay Winter, an eminent historian specialising in WWI and analysing the conflict's impact on world history. But what happens when the matter itself, present in a war-battered landscape, is irretrievably disappearing, to remain unrecognised and undocumented, at a time when the meaning of this historical moment has only begun to crystallise? Such a time (2014-2018) forms the framework for the *Archaeological Revival of the Memory of the Great War (APP)*. The area covered by the research is the drainage basin of the Rawka and Bzura rivers in central Poland.

The aim of the studies carried out by the ten-strong APP Research Team, supported by several collaborators, is to raise social awareness of this total and industrialised war as well as its long-range consequences. We have chosen to focus on restoring the memory of the events from the period of December 1914 through July 1915, which took place in the Eastern Front of WWI on the Rawka and Bzura rivers. We work to fill in the blank spots of history, archaeology and anthropology for the events one hundred years old. We expand knowledge in this field by assisting the memory of objects and places bearing the mark of the Great War; we present them both to experts (archaeologists and historians) and to the interested public. We aim for the material remnants of the formative events from 100 years back to be given curatorial care as well as the understanding of the local population; all important elements of a painful heritage. It is our intention to see a cultural park dedicated to the memory of the victims of wars (civilian and military alike) established in the commune of Bolimów. We make every effort to provide local institutions with knowledge (resulting from the APP project, funded by the NCN), instrumental in turning the former battlefield around Rawka into a prominent element in cultural tourism and in an educational and research exchange.

At the moment, archaeological field work on the part of the APP Research Team is matched with research in archives in Poland and abroad. It has proven to be fully justified to have used state-of-the-art

non-invasive methods in archaeological research. They are aimed at exploring the material remnants of history in such a way as to prevent their destruction. This is an alternative to excavation, which often causes damage to the artefacts under scrutiny. It is, among others, thanks to the analysis of laser scans of soil, the APP-developed Numerical Terrain Model, and geophysical (magnetic and electrical resistivity) imaging that we gradually see more and more success in proving the significance of non-invasive methods of collecting data on the present condition and unique character of the terrain under scrutiny (including traces of destructive activities, the so-called detectorists). Doing our best to limit our interventions into the soil to a minimum, we have carried out excavations over an area of 30 ares. They have yielded genuinely significant results which we have been discussing and presenting at conferences at home and abroad.

So far, we have uncovered three war cemeteries, which had fallen into disrepair and suffered serious damage. Also the remains of soldiers missing in action in no-man's-land have been found; they await a burial ceremony in an ossuary, the construction of which has been initiated by us. Under way is a close study of life in the trenches which involves the inspection of material remains related to the operational architecture of the trench warfare.

We have undertaken to study sensitive spots, i.e. to carry out a project concerning the archaeology of the Great War to contribute to the anthropologically-oriented archaeology of modern military conflicts. It stems from the conviction that increasing our knowledge about the life and death of soldiers in the trenches, and revealing its material remains, will help revise our idea of the meaning and aftermath of warfare on the territory of today's Poland that affected both servicemen and civilians. Using the methodology of preventive conservation, in accordance with international bodies' directives, we have proven the merit of non-invasive methods, particularly in the study of sensitive spots, related to a "painful heritage," weighted with a "moral message," including a lesson of empathy, all of which we – archaeologists – may exhibit and emphasise. The character of the research and the uniqueness of the monuments and the landscape scarred by the Great War, never hitherto subject



to such comprehensive a study, gives us material to reflect upon in ways that are no less challenging than they are important. We hope to present its results in a monograph, to be published on the centenary of the Great War's conclusion in 2018.

Dr hab. Anna Zalewska

Archaeologist and historian (Institute of Archaeology, Maria Curie-Skłodowska University; Institute of Archaeology and Ethnology, Polish Academy of Sciences). Researcher in projects representative of a methodologically-, transdisciplinary-, memory- and prosocial-oriented approach. She has a special interest in the social role of the material remnants of the past, the archaeology of the present, memory and the agency of objects and places, palimpsests, material-discursive practices in the long term (*longue durée*). In the project *Archaeological Revival of the Memory of the Great War*, she is in charge of the APP Research Team, interpreting the results of invasive and non-invasive archaeological studies, preliminary archival research and advanced analyses.



The ecology of human-wildlife conflicts: disentangling the drivers of damage caused by brown bears at a biographical, population and individual level

HARMONIA 4

Call concluded on the 2nd July 2013
NCN Panel: NZ 9

Prof. Nuria Selva Fernandez

Institute of Nature Conservation,
Polish Academy of Sciences

The project seeks to contribute to the knowledge of the damage caused by wild animals. For the model species of our study we have chosen the brown bear. We focus on the damage caused by this predator with a view to identifying the ecological and behavioural factors which determine the occurrence of human-wildlife conflicts. We examine them on three levels: biogeographical (among-population), local (within-population) and individual.

On the biogeographical (continental) level, we are striving to answer the question about what it is that makes some populations more likely to engage in conflict than others. To that purpose, we analyse data on the damage caused by the European bear population. We study the influence of selected anthropogenic factors, such as the density of settlements, habitat-specific factors (such as the length of the forest ecotone) on the incidence of damage. We also investigate the possible role of the bears' numbers and current population management policies.

On the within-population level, we focus on the bear population segment of the Eastern Polish Carpathians, and analyse the data on the damage caused in the last 15 years. We suppose that food availability, climatic conditions and habitat features (forest cover, the distance to protected areas and human settlements) all play a role in the incidence of damages. It is our goal to identify the conflict hotspots and to map the risk.

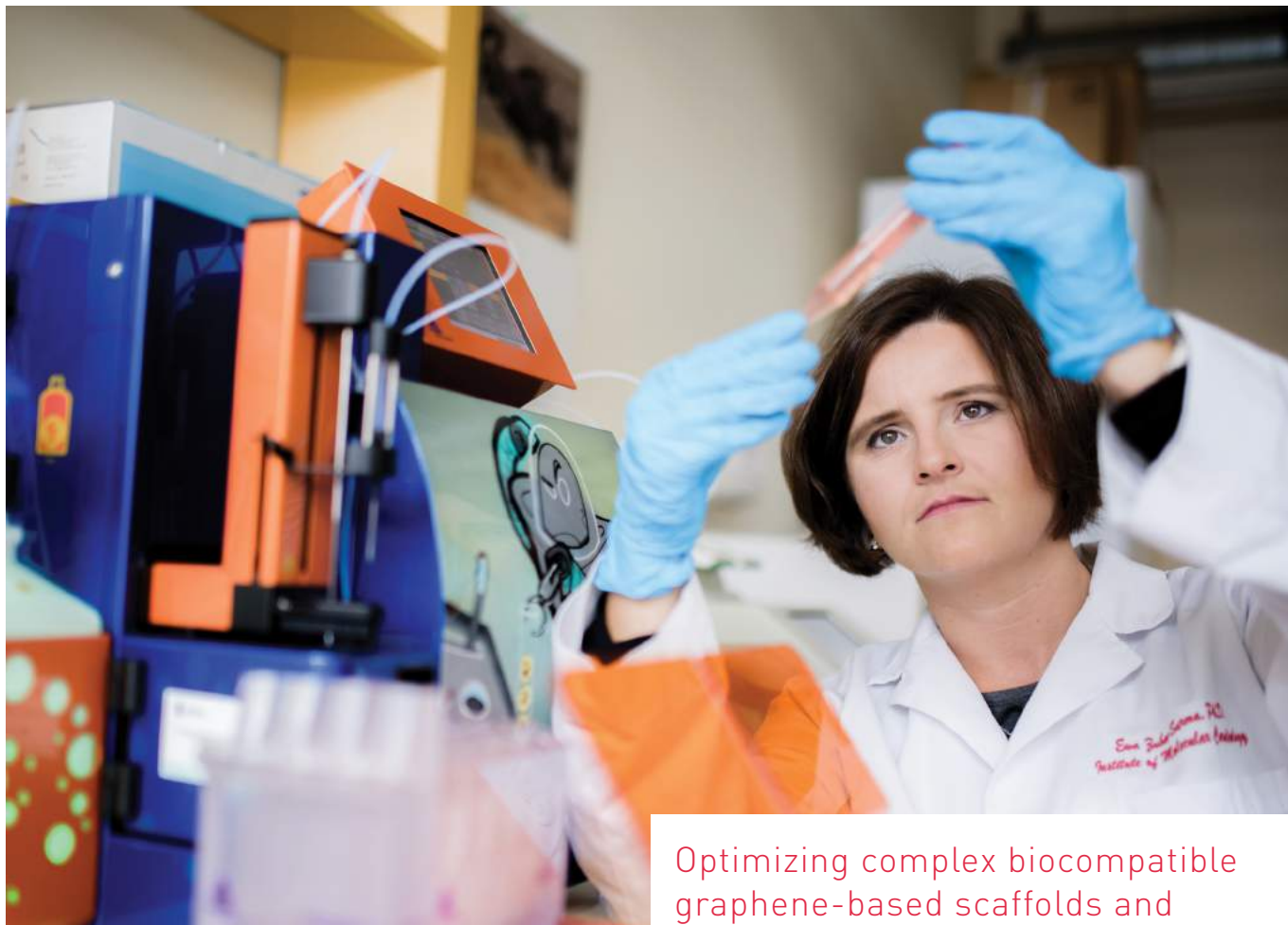
We think that not all bears cause damage. Rather, there is a portion of individuals within the population responsible for most damage. We investigate whether the likelihood of such behaviour is sex- or kinship-conditioned, and whether it has anything to do with a different diet or elevated levels of stress hormones. For us to draw conclusions on the damage-causing individuals, it is necessary that we collect information on the entire population. That is why one of the project's goals is to estimate the number of the eastern segment of the Polish brown bear population, determine its respective densities and gather data on its diet and stress levels. To that end, in the Polish part of the Carpathians, we are conducting genetic monitoring. Fieldwork

combines hair-trapping and collecting faeces samples along transects. The material collected will be used in genetic, isotope and hormonal analyses.

Preventing damage and reducing the field of conflict have been considered as one of the priorities and chief actions to be taken in order to protect the population of the brown bear in Europe and in Poland. We are of the opinion that understanding ecological and behavioural mechanisms underlying the occurrence of damage is essential for conflict reduction, and, in this sense, decisive for the future of many populations of protected species

Prof. Nuria Selva Fernandez

Works with the Institute of Nature Conservation, Polish Academy of Sciences (Kraków). She took her doctoral degree in biology from the University of Seville. She conducted studies for her doctoral dissertation concerned with the role of carrion in temperate climate forests – specifically in Białowieża Forest. Currently she is involved with research of large carnivorous mammals – especially bears. Her interests deal predominantly with the interactions between consumers and their resources. In her research she employs, among others, isotope techniques and trophic network analysis. She is also interested in applied research which could contribute to increased protection of biological diversity.



SYMFONIA 3

Call concluded on the 22nd July 2014
NCN Panel: NZ 4

Optimizing complex biocompatible
graphene-based scaffolds and
defining stem cell populations for the
purpose of tissue regeneration

Prof. Ewa Zuba-Surma
Jagiellonian University

Cardiovascular dysfunctions are classified as 21st-century lifestyle diseases and a major root cause of deaths in developed countries. According to estimates, they account for about half of the total number of deaths in Poland, with acute myocardial infarction being the leading cause. Infarction results in local ischemia, leading to myocardial necrosis, followed by scarring that impairs correct functioning of the heart. Although regenerative medicine has made immense advancements, as for now no effective method of treatment and substitution of heart tissue damaged by myocardial infarction has been found. Hence the pressing need to continue the search for alternative methods of cardiac regeneration therapy, improving the quality of life in patients suffering from heart failure. Currently, research into the use of stem cells (SC) and their derivatives in the therapy of cardiovascular dysfunctions has raised much hope. However, for the therapy to be effective, it is necessary to ensure optimum ex vivo processing of the cells before they are applied to the injured area.

One of the more promising SC types used in regenerative medicine are mesenchymal stem cells (MSCs), obtained from various sources, including bone marrow, fat tissue and the umbilical cord. This SC population is easy to isolate and culture, and has a vast differentiation potential, which means that it can be used to create cardiomyocytes and endothelial cells. What is more, MSCs are characterized by low immunogenicity and exhibit immunomodulatory properties (which are highly desirable in regeneration), while their use is completely free from ethical dilemma. MSCs participate in reparatory processes by differentiation into the cells of a specific damaged tissue, or by the secretion of biologically active agents influencing endogenous cells in the injured area, including microvesicles (MVs). MVs are membrane-covered follicles released from the surface or interior of cells that work as carriers for bioactive agents, such as proteins and nucleic acids, transferring them between cells. Being mediators in inter-cell communication, MVs with SCs can also participate in tissue regeneration.

A number of procedures designed to increase the SCs' regenerative potential have been used to boost the effectiveness of currently-used stem cell therapies – from ex vivo pre-differentiation to combined use with biocompatible scaffolds, applying the achievements of contemporary bio-material engineering. One of the more promising materials, with potential for biomedical application, is graphene – a material consisting of a single layer of carbon atoms arranged in a hexagonal network. Thanks to this unique structure, graphene has exceptional properties which are already being used in numerous disciplines, most recently in medicine. One of its properties is high effectiveness of interaction with biological molecules, enabling its fast modification and thereby increasing the scope of possible applications.

The purpose of this project is to attempt innovative use of scaffolds based on graphene derivatives, to induce the differentiation of human MSCs, in order to obtain myocardial tissue cells. The main objective of the research is to develop the optimum method of obtaining graphene derivatives for myocardial tissue regeneration. What is more, we will investigate the impact of innovative composites generated by adding biologically active functional groups to graphene's surface, on selected functions of MSCs that play an important role from the perspective of stimulating the regeneration of damaged myocardial tissue. We will also examine the activity of MVs sourced from MSCs cultures on graphene surfaces as a safe alternative to myocardial cell therapy.

The project involves interdisciplinary cooperation between two leading research institutions in Poland: the Jagiellonian University in Kraków, and the Institute of Electronic Materials Technology in Warsaw. The combination of scientific achievements in the fields of chemistry and molecular and cellular biology gives grounds for interdisciplinary research leading to the development of unique bio-composite graphene derivatives that will be usable in contemporary regenerative medicine.



Prof. Ewa Zuba-Surma

Alumna of the Faculty of Biology and Earth Sciences at Jagiellonian University in Kraków, in 2004 she was awarded her PhD in biological sciences for a dissertation supervised by Prof. Juliusz Pryjma. In 2005 Prof. Zuba-Surma went to Louisville, USA, where she was a post-doc fellow working on stem cell biology, stem cell application in tissue regeneration and image cytometry. On her return, she introduced this technology to Poland. In 2009 she was awarded her post-doctoral degree of *doktor habilitowany* and returned to her alma mater – Jagiellonian University in Kraków, Faculty of Biochemistry, Biophysics and Biotechnology. Since 2011 she's been working at the Cell Biology Section at this Faculty, where she has built her research team working on projects financed by the National Science Centre (SONATA BIS, SYMFONIA), the Polish Science Foundation (HOMING, TEAM), and the National Centre for Science and Development (POIG). She has received a number of awards for her academic achievements and contribution to research on stem cells, including the ISAC President's Award for Excellence (2008), a Prize awarded by the Prime Minister of Poland for her post-doctoral dissertation (2010), and individual prizes awarded by the Rector of Jagiellonian University (2010-2015).



CHIST-ERA

*Heterogeneous Distributed
Computing*

Heterogenous Parallel and Distributed
Computing in Java

Prof. Piotr Bała

Interdisciplinary Centre for Mathematical and
Computational Modelling, University of Warsaw

On October 1st 2014 the Interdisciplinary Centre for Mathematical and Computational Modelling (ICM, University of Warsaw) commenced the HPDCJ project funded within the CHIST-ERA framework. The aim of the project is a change in developing code on the parallel and distributed heterogeneous computer architecture; in particular, introducing Java as the programming language for such applications.

Modern computers of all kinds, including home-use PCs and the largest supercomputers, can be composed of many processors. Each processor can be made up of dozens of computational units (cores). Each computer, therefore, can possibly contain cores numbering in the hundreds of thousands. Writing programmes utilising such multicore devices is complicated. The traditional programming methods are not effective and do not utilise new and innovative multicore architecture.

We have already hit the limit in making single processors faster and more efficient. The only way to make computers faster is by increasing the number of processors and cores. Java programming language is gaining high popularity especially where processing of large data sets is considered. However, there are still no good programming tools and libraries which allow programmers to write scalable Java code that can run efficiently on the hundreds and thousands of cores.

The focus of the HPDCJ (Heterogeneous Parallel and Distributed Computing in Java) project is to adapt the Java language for heterogeneous parallel and distributed computing and significantly improve the programmability of Java applications. Our plan is to show the applicability of the framework on a set of carefully selected applications that are deemed key for the future. We will work with these key Big Data applications and kernels that are ubiquitously used by our massive target user base. To achieve this, we will develop and adapt our pre-existing parallel Java library to parallel heterogeneous and distributed platforms. In relation to candidate exascale platforms, we will investigate solutions for parallel Java on systems that use accelerators. Thus, our potential success will create a solution for Java that will be attractive to millions of users.

The HPDCJ project will develop Java library tools and programming models for scalable parallel computing. Novel algorithms developed will address, amongst others, communication and synchronization in heterogeneous multicore systems. The PCJ library will be optimized to handle data placement and transfer of large data volumes.

The project will strengthen European industry and research in the supply, operation and use of HPC systems. In particular, we have identified a vacuum within the industry which represents an opportunity for Europe to achieve leadership in parallel and distributed computing, by developing solutions for mainstream computing. In addition, we will target world industry-wide best practice by publishing high quality scientific papers in important journals and by presenting our work at key scientific conferences and related events.

For more information please see:

PCJ: <http://pcj.icm.edu.pl>

HPDCJ: <http://pcj.icm.edu.pl/hpdcj>

Prof. Piotr Bała

Professor at the Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw. His main research interest focuses on parallel and distributed computing but also includes molecular and quantum dynamics, quantum-classical molecular dynamics. The PCJ library for parallel computing in Java created by professor Bała's team received the HPC Challenge Best Productivity Award at the Supercomputing Conference in 2014.

Partners: Dr Costas Bekas, IBM Research LAB, Switzerland; Prof. Dimitrios Nikolopoulos, Queen's University of Belfast, UK; Dr Buğra Gedik, Bilkent Üniversitesi, Turkey



BEETHOVEN 1

Call concluded on the 12th October 2015

The Late Neolithic and Early Bronze Age in the Southwestern Baltic area (2500–1500 BC). Why did Bruszczewo-Łęki Małe political structures develop?

Prof. Janusz Czebreszuk

Adam Mickiewicz University in Poznań

Prof. Johannes Müller, Kiel University

Exactly 4 thousand years ago, so ca. 2000 BC, the picture of our continent began to change dramatically. The change that took place did not only affect existing technology but society as a whole. Resources such as stone and copper, previously dominating the existing material range, were being replaced by a completely new substance – bronze, which allowed the creation of more useful tools and weapons. Since bronze is composed of copper and tin which rarely appear in the same ores, in order to acquire this precious metal, it became necessary for people to establish long-distance connections to mining areas. Today we still say that travelling broadens the mind. Undoubtedly this proverb has its origins somewhere around 2000 BC.

The trade in raw materials and social changes in the late Neolithic period

Travellers would not only transport copper and tin but other metals (silver, gold, lead) and rare resources (amber, ivory, semiprecious gemstones) as well. Together with people and resources, travelling included the transmission of ideas and innovations. The acquisition of bronze and the metals necessary for its production required societies living away from ore deposits to shape and maintain exchange networks; this resulted in new economic, cultural and ritual behaviors. Within just a few generations, the existing Europe “shrunk”: the geographic and cultural distances between particular regions of the continent was reduced as a result of the constantly changing and more extensive exchange networks. Within them, particular communities and parts of Central Europe were playing out different roles. Some of them, by exploiting locally available resources and strategic locations as well as benefiting from the possibilities arising from the ever-growing exchange and cultural contact, developed into key hubs. However, simultaneously more and more clear inequalities began to appear between particular regions. Nevertheless, the most important were societal changes, including the emergence of elites and an internally visible hierarchy. Elites were consequently using material culture to construct their superior societal position and they really excelled at it.

One of the best examples of such transformations is in the vicinity of Kościan in Greater Poland. An Early Bronze Age settlement is located there and along with its neighboring surroundings, from 1999 to 2008, was examined by an interdisciplinary research conducted by an international Polish-German scientific team from Poznań and Kiel. Excavations in the area resulted in 7 monographs and over 100 scientific articles. The acquired database allowed one to formulate new research questions and to outline new directions in Bruszczewo settlement studies and more broadly – the whole microregion, including the “princely graves” cemetery in Łęki Małe. An attempt at answering such questions will be the “The Late Neolithic and Early Bronze Age in the Southwestern Baltic area (2500-1500 BC). Why did Bruszczewo-Łęki Małe political structures develop?” project – a joint initiative of the Adam Mickiewicz University in Poznań and the Christian-Albrechts-Universität in Kiel, awarded funding Under the Beethoven 1 funding opportunity.

Cultural changes in Bruszczewo

The aim of the project is to study and present the origins and characteristics of the Bruszczewo-Łęki Małe structures in the broader context of the Southwestern Baltic region. The spatial scope includes regions ranging from Holstein through to Greater Poland and Kujawy. This area, during the interstage of the Neolithic and Bronze Age (2500-1500 BC), was characterised by a similar pace of cultural transformations, mostly affected by the following phenomena: Single Grave culture, Bell Beakers, the so-called Dagger Period and Únětice culture. When it comes to Bruszczewo-Łęki Małe structures, they are regarded as small, spatially limited concentrations of particular activity types of the Únětice communities. The initial hypothesis regarding these structures was proto-state units which existed along main exchange routes (“trail communities”); these blossomed in Europe around 2000 BC. As such, the aim of the project is to display, on the basis of a dynamically perceived environment, interactions between different communities rooted in the Late Neolithic and Early Bronze Age traditions, resulting in the development of some of the



S. Jagiolla, © Archaeological Muzeum Poznań

oldest elite communities. An additional goal is to explore the extent to which these processes were specific for the Southwestern Baltic area, and how they were related to the broader transformations of a Pan-European character.

The archaeological research of the project has two spatial ranges. The first one covers the local surrounding of the Kościan group, especially the Łęki Małe cemetery, where a set of interdisciplinary methods will be applied for archival finds, along with a broad programme of field surveys and test trenches in the immediate vicinity of the burial ground. This stage will emphasise an archaeological and palaeoenvironmental approach. The second level of inquiry will cover larger spatial units in order to provide an insight into the whole Southwestern Baltic area. A wide variety of scientific analyses will be applied, including radiocarbon dating, metal analyses, petrography, textile imprint analysis, a DNA research, and lipid analyses, which will simultaneously contribute to a few modules.

The realisation of the project will provide a new model of cultural transformations in the Southwestern Baltic area during the interstage of the Late Neolithic and Early Bronze Age. This approach will contribute by combining environmental factors with the development of complex societal structures of the Bruszczewo-Łęki Małe type. The achieved model will be multi-dimensional in character. Aside from its temporal and spatial scope, it will include socio-political dynamics – the degree of participation of particular regional/local communities in the process of developing the internal hierarchy. The project's completion will contribute to the state of knowledge on the interstage of the Late Neolithic and Bronze Age in the lowland regions of the Southwestern Baltic area, equaling those achieved for the surrounding areas (southern Scandinavia and the loess terrains of Central Europe). The anticipated results will display to the fullest extent the unique character of the cultural phenomena in the Southwestern Baltic zone during this particular part of prehistory.



Prof. Janusz Czebreszuk

Professor Ordinarius of Archeology at the Adam Mickiewicz University in Poznan. Currently head of the Bronze Age Mediterranean Archaeology Laboratory at the Institute of Prehistory and Director of the Centre for Research on the Beginnings of European Civilisation. He specializes in the historical problems of Europe during the third and second Millennium BC. He has studied the turn of the Neolithic and Bronze Age to the north of the Carpathians, the far-reaching cultural relations binding the population of Central Europe from the Carpathian Basin and the zone of the Aegean and issues of social change during the third and second Millennium BC. An important direction of his research is also the question of the application of non-invasive methodology of field research in archeology (especially the geophysical prospecting method). Additionally he investigates issues related to the importance of amber in the prehistory of Europe. He is the author of approx. 200 scientific papers, including 8 monographs and 17 editorial volumes. His publications were printed in Belarus, Belgium, Croatia, France, Greece, The Netherlands, Lithuania, Latvia, Norway, Russia, Serbia, the USA, Great Britain and Italy.



Prof. Johannes Müller

Professor (C4) for Prehistoric Archaeology (Prehistory) and director of the Institute for Pre- and Protohistoric Archaeology at Kiel University since December 2004. He studied in Freiburg and Edinburgh, and obtained his Master's degree and doctorate in Freiburg. After completing a DAI (Deutsches Archäologisches Institut) travel grant, he became academic assistant at Freie Universität Berlin, where he obtained his habilitation, whereupon he held teaching positions in both Freiburg and Cologne. In 2000, Johannes Müller was appointed Professor (C3) for Pre- and Protohistoric Archaeology in Bamberg and later became head of Bamberg's Institute for Archaeology and Cultural Heritage. Johannes Müller is initiator and spokesman of the graduate school "Human Development in Landscapes" (DFG-Initiative of Excellence) and coordinator of the DFG's priority program "Early Monumentality and Social Differentiation". Field research is being conducted in i.a. Bosnia, Poland, Germany and Ukraine. Excavation projects range from megalithic tombs, Neolithic and Bronze Age settlements to Eastern European settlement mounds and Ukrainian mega-sites.



Coupling of synthesis and transport for
proteins targeted to the mitochondria

OPUS 6

Call concluded on the 6th May 2014
NCN Panel: NZ3

Prof. Agnieszka Chacińska
International Institute of Molecular
and Cell Biology in Warsaw

Research interests of the group led by professor Agnieszka Chacińska focus on understanding the dynamics of elements of cells, the building blocks of our bodies. The research addresses mitochondria, the parts of cells involved in energy production. Mitochondria are often referred to as “cellular power plants,” as it is inside them that the chemical particles serving as the cells’ energetic currency are produced. As is the case with all other cellular processes, mitochondrial processes are effected through proteins. Despite having their own genetic information, in the form of mitochondrial DNA, and an apparatus for its expression, mitochondria are not autonomous organelles. A vast majority (99 per cent) of mitochondrial proteins are synthesized outside mitochondria – in cytosol, based on the genetic information stored in cell nuclei. On analysing the mitochondria’s contents it was concluded that they store between 10 and 20 per cent of all cellular proteins. Measurements of mitochondrial proteome, i.e. the complete set of mitochondrial proteins, suggest a figure of 800-1000 proteins in the simple model organism of yeast. It is estimated that in higher eukaryotic organisms, e.g. humans, there are over 1,500 different proteins forming functional mitochondria.

The research efforts of Prof. Chacińska’s team seek to learn the processes behind the transport of mitochondrial proteins and preserving the pool of mitochondrial proteins in the right condition throughout the lifetime of the cells and the entire organisms. The team’s most significant achievements include their contribution to the discovery of dynamic processes responsible for the transport of proteins and the processes shaping the mitochondrial proteome. The discoveries of the past years come as a result of other NCN-financed projects. Prof. Agnieszka Chacińska, Dr Piotr Brągoszewski (laureate of a SONATA call) and their collaborators proved the existence of the process of release of mitochondrial proteins combined with their degradation in cytosol. The phenomenon of retrotranslocation is instrumental in an effective system of quality control, which allows for a flexible mitochondrial proteome response to cells’ physiological and metabolic demands. Dr Lidia Wróbel & Dr Ulrike Topf, grantees of the ETIUDA and OPUS programmes, working under the supervision of Prof. Chacińska, discovered cellular defence mechanisms against

faulty mitochondria. Activation of those mechanisms prevents errors in protein transport and the destructive process of accumulation of mitochondrial proteins outside mitochondria.

Professor Chacińska’s basic research is critical to the understanding of the links between the mitochondrial protein homeostasis and processes such as ageing, metabolic disorders, and neurodegeneration. In the long term it could contribute to the development of strategies for treating and preventing many serious diseases related to faulty mitochondria.

Prof. Agnieszka Chacińska

She is a graduate of the Faculty of Biology, University of Warsaw, and in 2000 she received her doctoral degree for a dissertation in biochemistry at the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences. From 2001-2009 worked at the University of Freiburg, as a postdoc and head of a research group. In 2008 she was conferred a habilitation degree, and in 2014 the title of full professor.

Since 2009 she has been based at the International Institute of Molecular and Cell Biology in Warsaw, where she is the group leader of the Laboratory of Mitochondrial Biogenesis. She is the recipient of prestigious grants: the Wellcome Grant of the Foundation for Polish Science and EMBO. Her research group’s current operations are supported chiefly by the National Science Centre.

WWW.NCN.GOV.PL