



# ACADEMY OF FINLAND ANNUAL REPORT 2014



ACADEMY OF FINLAND

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# MANAGEMENT'S REVIEW

Two events dating from September 2013 were pivotal in shaping the Academy's year under review: the publication of the international evaluation of the Academy of Finland and the government resolution on the comprehensive reform of state research institutes and research funding. The international evaluation found that the Academy runs a well-organised, effective and efficient operation. Good progress has been made with addressing the evaluation's ten principal recommendations. An amendment to the Act on the Academy of Finland on 1 July 2014 brought changes to the composition of the Academy's Board and paved the way to the establishment of a Finnish Research Infrastructure Committee as well as a Strategic Research Council (SRC) under the Academy's auspices.

Funding for strategic research is intended to support the development of societal functions and processes through problem-centred, long-term and programme-based research. Funding is made available on a competitive basis to research addressing the various major challenges faced by society, such as research aimed at supporting the restructuring and competitiveness of business and industry, workplace development and public sector development. This will put the Academy in a stronger position to advance multi-disciplinary, solution-oriented research that facilitates informed decision-making.

The Act also makes mention for the first time of the Finnish Research Infrastructure Committee (FIRI Committee), which has full decision-making powers over the funding of national research infrastructures in Finland. The FIRI Committee set out to draft a national

research infrastructure strategy and to prepare funding decisions for 2014.

Another major development in 2014 was the decision to introduce a new funding instrument to strengthen Finnish universities' research profiles in key areas of strength. Preparations for the launch of the instrument in 2015 started in the spring in collaboration with the Ministry of Education, Science and Culture and universities.

In 2014 the Academy continued to strengthen its role as the central body for science administration and science policy expertise in Finland. Key tools in these areas include reports on the state of science in Finland and other actions that provide the Ministry of Education, Science and Culture, universities, research institutes and others with up-to-date information about the state and quality of scientific research. Mechanisms for data collection on universities' resources and publications have significantly improved and become more accurate. Bibliometric analyses of publishing activities, for instance, including breakdowns for individual research organisations, have allowed for the compilation of datasets that are relatively easy to keep updated.

Distinct university profiles, the division of labour and cooperation among universities, the small size of research units and the significance of international cooperation were repeatedly highlighted in the discussions that the Academy had during the year with various research organisations. The separate surveys conducted in connection with the state of scientific research project on national research infrastructures and professorial recruitment also prompted discussion about the investments and choices made by universities and government

research institutes.

In the science policy field, one of the Academy's key areas of focus has been to monitor the impact of research and to develop related processes. A key consideration in planning these activities is the evolution of the Administration Office's budget.

The Academy of Finland's Administration Office was restructured to reflect the ongoing reforms. A distinction was introduced between general and thematic research funding. The latter includes Academy Programmes and strategic research funding.

The Academy's most important role is to review applications for competitive research funding and to make funding decisions based on the reviews conducted by international evaluation panels. In 2014, the number of applications received for the Academy's major funding instruments were as follows: Academy Projects 1,324, research posts as Academy Research Fellow 551 and research posts as Postdoctoral Researcher 1,003. In all, a total of 4,186 applications were processed.

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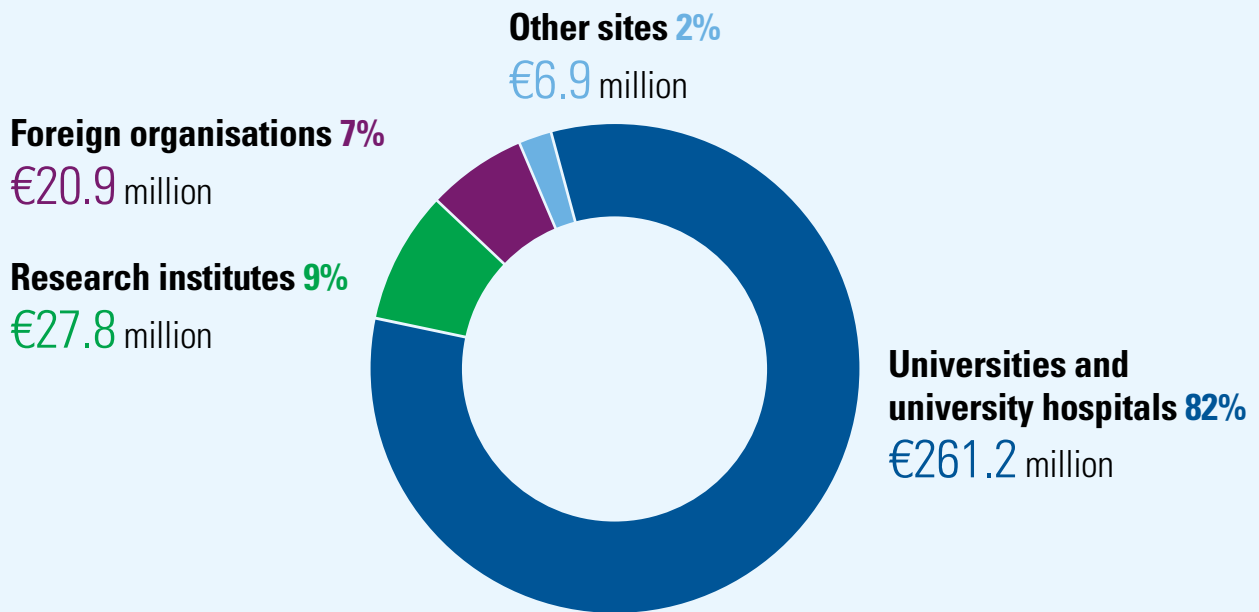
emy's major funding instruments were as follows: Academy Projects 1,324, research posts as Academy Research Fellow 551 and research posts as Postdoctoral Researcher 1,003. In all, a total of 4,186 applications were processed.

The Academy's strengthening role in the science policy area was above all reflected in its deepening collaboration with key stakeholders. Preparations for the State of Scientific Research 2014 project were undertaken in close consultation with the Ministry of Education, Science and Culture, universities and government research institutes.

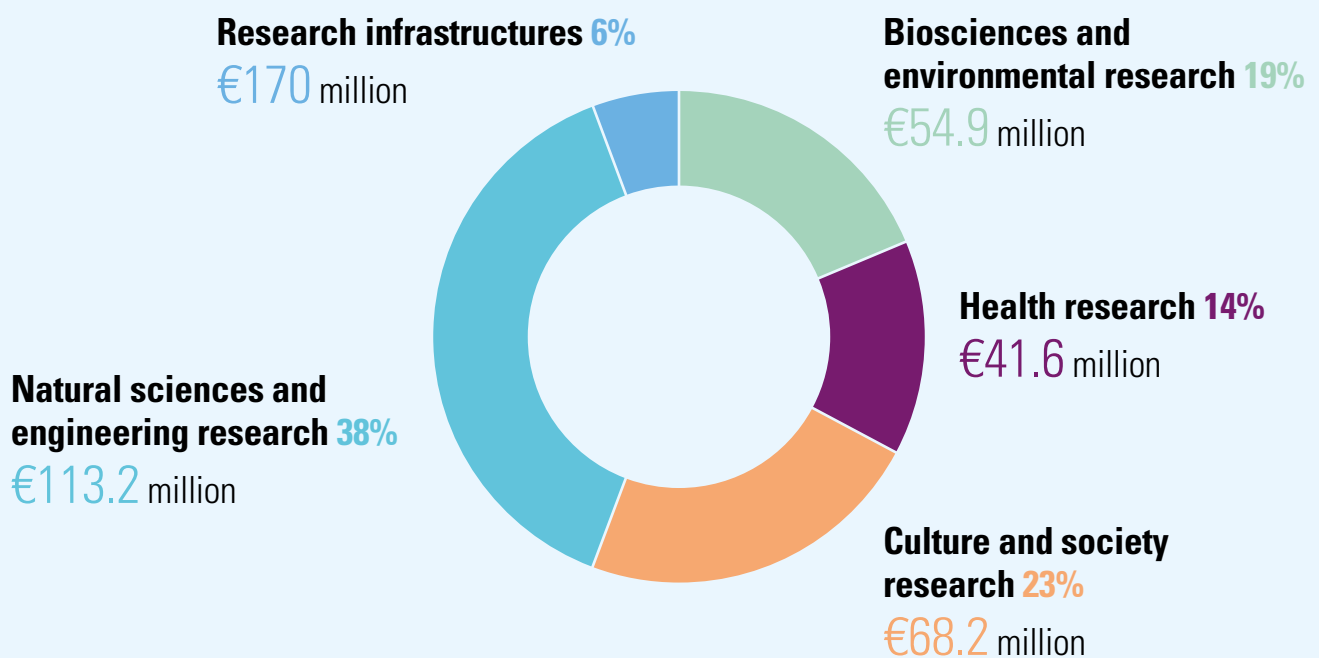
Together with the Finnish Funding Agency for Innovation Tekes, the Academy launched the ICT 2023 programme as well as an experimental programme to encourage dialogue and exchange between leading-edge research and industry, which allows Academy-funded projects in the health research field to apply for funding for the development of commercial applications. This creates a new kind of interaction between the application and impact of research, on the one hand, and scientific quality, on the other, which may pave the way to deeper collaboration with the funding community.

## FUNDING DECISIONS IN 2014

### FUNDING DECISIONS, BY RESEARCH SITE

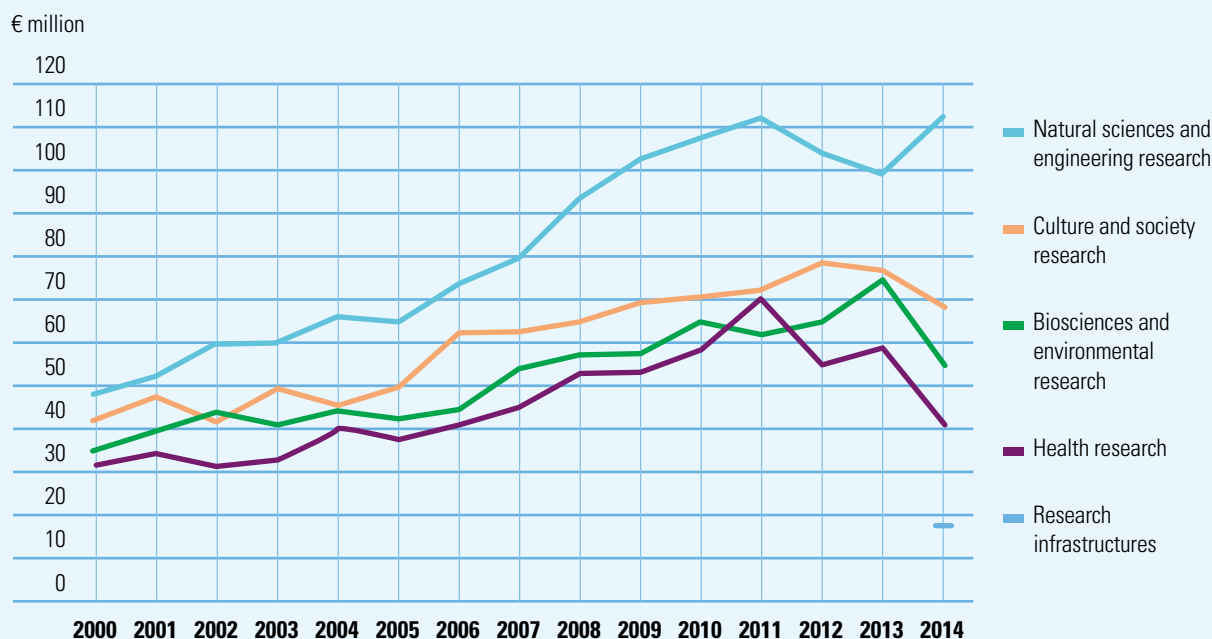


### BREAKDOWN OF FUNDING DECISIONS BY RESEARCH FIELDS AND RESEARCH INFRASTRUCTURE FUNDING \*



\*Excluding membership dues to international research organisations etc.

## FUNDING ALLOCATED, BY RESEARCH FIELD 2000–2014



## DEVELOPMENT OF FUNDING (€), BY UNIVERSITY

Research site	2011	2012	2013	2014
UNIVERSITY OF HELSINKI	102,194,613	105,303,527	116,868,898	96,679,516
AALTO UNIVERSITY	38,890,553	30,174,813	27,768,285	45,255,591
UNIVERSITY OF JYVÄSKYLÄ	29,401,074	26,083,590	24,183,322	25,742,421
UNIVERSITY OF TURKU	28,091,101	29,541,926	37,420,854	22,050,978
UNIVERSITY OF OULU	18,389,120	18,204,471	21,210,526	15,577,620
UNIVERSITY OF EASTERN FINLAND	17,110,971	15,963,689	14,419,924	14,334,647
UNIVERSITY OF TAMPERE	17,289,935	12,672,564	12,382,990	14,247,971
TAMPERE UNIVERSITY OF TECHNOLOGY	11,906,617	11,971,955	9,515,984	12,567,823
LAPPEENRANTA UNIVERSITY OF TECHNOLOGY	2,828,101	3,488,267	3,477,783	5,830,195
ÅBO AKADEMI UNIVERSITY	10,364,901	6,894,292	9,515,984	4,357,369
UNIVERSITY OF LAPLAND	1,130,972	885,782	781,469	2,260,705
HANKEN SCHOOL OF ECONOMICS	1,367,010	1,322,850	1,002,804	626,310
UNIVERSITY OF THE ARTS HELSINKI				327,011
UNIVERSITY OF VAASA	949,083	610,300	1,024,492	10,813
<b>Total</b>	<b>279,914,051</b>	<b>263,118,026</b>	<b>279,573,315</b>	<b>259,870,984</b>

## RESEARCH FUNDING, BY TYPE OF FUNDING

### Research environments 6%

€17.0 million

Research infrastructures €17.0 million

### Researchers 30%

€96.0 million

Academy Professors €5.5 million

Academy Research Fellows €26.6 million

Postdoctoral Researchers €26.2 million

Research costs of research posts €28.8 million

FiDiPro €9.0 million

### Other 7%

€23.0 million

Membership dues to international organisations €20.3 million

Researcher mobility €1.2 million

Administration Office project funding €1.5 million

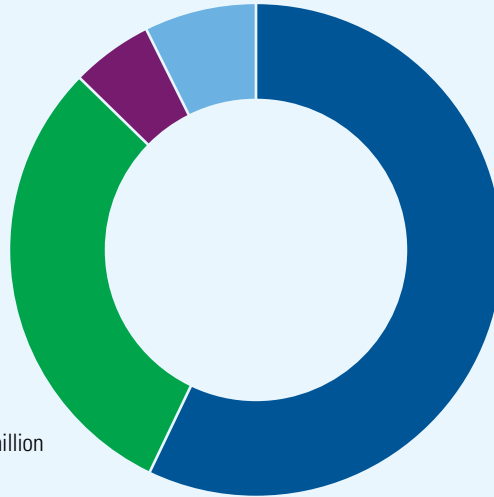
### Research projects 57%

€180.8 million

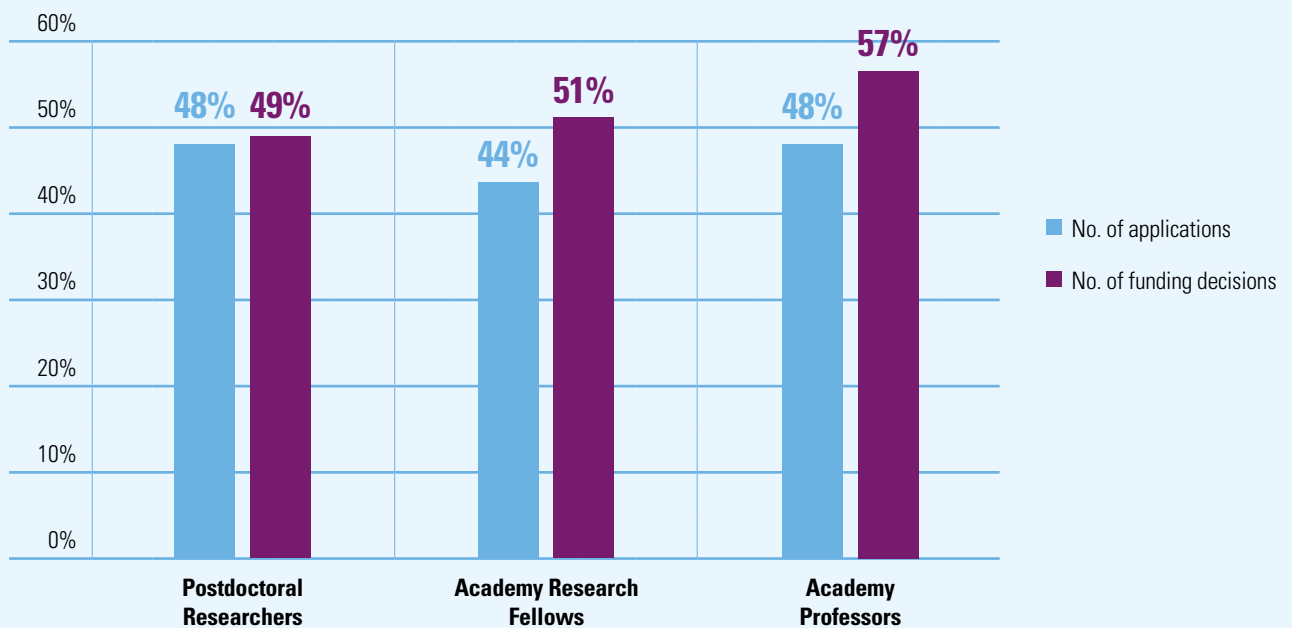
Academy Projects incl. strategic funding by research councils €113.2 million

Centre of Excellence programmes €28.4 million

Academy Programmes €39.1 million



## PERCENTAGE OF FEMALE APPLICANTS AND FUNDING RECIPIENTS



# HIGH-IMPACT RESEARCH RESULTS



## NEW INSIGHTS INTO MECHANISMS OF DRUG DEPENDENCE

Professor **Esa Korpi** (University of Helsinki) undertook a project to explore the mechanisms through which specific sedatives cause memory-like changes in dopamine neurons in the so-called reward pathway. Korpi and his team wanted to understand why anxiety-relieving medicines such as benzodiazepines are addictive. They discovered that sedatives with slightly different mechanisms of action also cause long-lasting memory traces in dopamine neurons. The mesolimbic dopamine pathway, a crucial part of the brain's reward system, is involved in the formation of both the rewarding and aversive effects of drugs of abuse. Based on the results it seems clear that so-called preventive interneurons play a crucial role in the regulation of dopamine cells. A closer understanding of the mechanisms involved may help reduce or even eliminate dependence on medicinal substances and drugs.

## A DIVERSE FOREST MANAGEMENT REGIME THE BEST WAY TO PROTECT NATURAL VALUES

Up to 40% of all forest stands in Finland would benefit economically from a management regime that does not allow thinnings. At the same time, this would significantly benefit biodiversity. Professor of Ecology and Environmental Management **Mikko Mönkkönen** and his team at the University of Jyväskylä studied the growth and development of a forest area measuring

68 square kilometres in central Finland, comprising a total of 30,000 forest stands. The aim of the project was to find ways of safeguarding and enhancing the biodiversity of the forest environment, at the same time as owners can continue to earn revenues from timber production. The team ran simulations of forest growth and future changes in forest structures under alternative forest management regimes.

## AUTOMATED IMAGE ANALYSIS IMPROVES THE SPEED OF PHENOTYPIC CLASSIFICATION

**Pekka Ruusuvuori** (Tampere University of Technology) had charge of a project concerned with image and data analysis and machine learning methods in systems biology applications. The project's team members worked to develop methods and algorithms for purposes of describing and studying cellular mechanisms, for instance. One key area of focus was phenotypic classification and analysis using pattern recognition and machine learning methods. Living cell samples, tissue and multicellular organisms can be analysed by image processing tools. The project created an automated image-based user environment in which the phenotypes of organisms can be classified using image processing tools and published online. Automatic phenotypic classification improves the speed of laboratory analyses and facilitates the distribution of results among different laboratories. The methods developed have proved useful not only in systems biology applications, but also in cancer research, medici-



nal drug design and in the study of viruses. The algorithms, methods and tools developed in the project have application in many different fields, presenting new commercial opportunities. Indeed, towards the end of the project team members were involved in setting up a company called Quva, which specialises in data analysis.

## PARENTS, TEACHERS AND CHILDREN'S LEARNING: WHO IMPACTS WHOM?

**Kaisa Aunola** (University of Jyväskylä) found in her project that a mother's belief in her child's capabilities, the warmth of mother-child interaction and supporting the child's autonomy in day-to-day learning situations all enhance the child's motivation to study maths. Supporting autonomy in everyday learning situations also contributes to a task-oriented approach to learning more generally. By contrast, if mothers or fathers have a style of everyday education that makes their children feel guilty, this undermines their sense of autonomy and adversely impacts their wellbeing, resulting in higher than typical levels of anxiety and ill temper. The results on child-teacher interaction showed that elementary teachers adjust their teaching to the child's ability.

## ACADEMY OF FINLAND AWARD TO RESEARCH ON CITIZEN INFLUENCE OVER NATURAL RESOURCE USE

The 2014 Academy of Finland Award for Social Impact was granted to Academy Research Fellow **Irmeli Mustalahti** (University of Eastern Finland) for her work in the field of environmental policy research. Mustalahti and her team have conducted comparative research into the possibilities and challenges of interactive governance in the context of combatting deforestation and forest degradation.

Mustalahti is working to identify and explore global processes of change that impact fairness and justice at different levels of environmental governance. Her research into the opportunities and challenges of participatory natural resource management will provide important support for planning and informed decision-making in future projects. The key research question for Mustalahti is whether it is possible to bring the individual citizen into focus and to have a genuinely interactive system of natural resource management. The choices faced are difficult indeed. Should forests be cut down to make way for food and energy production, or should efforts be focused on forest conservation? On the one hand, forests are active carbon

sinks that mitigate climate change, but on the other hand they are also important sources of income for people living in rural areas. When people feel they have a definite say in decision-making and when they feel the decisions reached are just and fair, it might also be possible to achieve progress in the governance of natural resources. Mustalahti is interested in how interactive and participatory decision-making works and how it impacts the governance and conservation of natural resources at different levels.

Mustalahti's comparative study comprises Tanzania, Nepal, Mexico and Laos, where her research is focused on the social and unpredictable outcomes of environmental programmes designed to curb climate change.

## ACADEMY OF FINLAND AWARD TO RESEARCH ON VISUAL SENSITIVITY

The 2014 Academy of Finland Award for Scientific Courage was granted to Academy Research Fellow **Petri Ala-Laurila**. Ala-Laurila is concerned in his work with the mechanisms of processing visual data in neural circuits, focusing on how the visual system is able to detect minute signals produced by only a handful of photons. Ala-Laurila has a diverse education, which is crucial to success in multidisciplinary research.

The human visual system performs with remarkable fidelity, coping with changes in ambient light that may vary one billion fold. In many respects our visual perception is superior to cameras operating in comparable conditions. Ala-Laurila and his team are concerned to investigate the key mechanisms that set the absolute limits for human vision. The bespoke technological equipment at the team's laboratory is state-of-the-art. To measure the absolute capacity of the retina, the team uses methods and equipment found almost nowhere else in the world. Ala-Laurila's research is a seamless blend of electrophysiology, behavioural tests at different levels of the visual system, mathematical modelling of the retina, and psychophysics. His work is unique in that it involves analysing vision from the molecular and cellular level all the way to the visual system level. The retina is like a secret doorway to the mechanisms in the human brain that process neural information. Ala-Laurila's results will help understand the absolute limits of the signal processing capacity of small neural circuits, and also aid in the design of better equipment for night vision, for instance. They can also shed new light on the causes of certain retinal diseases. Furthermore, thanks to their universal applicability, the results can be applied to signal processing studies of other sensory system.



# INTERNATIONAL FUNDING COOPERATION

The Academy of Finland engages in global cooperation with research funding agencies among other things in the form of joint international calls. Joint calls based on bilateral agreements of cooperation were announced both in connection with research programmes and via the Academy's research councils. In the national context, the Academy also works closely with the Finnish Funding Agency for Technology and Innovation Tekes and others to organise calls for joint projects

In 2014, the Academy organised joint calls together with China (NSFC) on 5G networks; with Brazil (FAPESP) on materials research; with India (DST) on energy research; and with the United States (NSF), where the Academy was involved in the Partnership for International Research and Education (PIRE) programme in the field of learning, skills and education.

The Academy worked closely with Tekes to organise international joint calls in Japan (JST) and the United States (NSF). The joint call with Japanese partners was for research projects on the theme of information systems for accessibility and support of older people. The US joint call concerned research on wireless telecommunications. Furthermore, the Academy had cooperation with Russia via the ERA-NET RUS Plus consortium: the Academy was involved in three themes of the joint call launched by the consortium.

A total of nine million euros was granted in funding for FiDiPro professorships in strategically important and scientifically significant areas at universities and research institutes. This funding is intended to finance the work of world-leading professors at Finnish universities for an average term of five years. The

professors funded represent a wide range of scientific disciplines. They are internationally highly merited researchers in their respective fields and come from Australia, Spain, Ireland, Italy, France and Switzerland.

## NORDIC COOPERATION

NordForsk is a Nordic research funding organisation under the auspices of the Nordic Council of Ministers. The Academy of Finland contributes to financing NordForsk research programmes that are jointly prepared with other Nordic funding agencies. The Academy is also active in the Joint Committees of the Nordic Research Councils: the Joint Committee of the Nordic Medical Research Councils (NOS-M), the Joint Committee of the Nordic Natural Science Research Councils (NOS-N), and the Joint Committee for Nordic Research Councils for the Humanities and the Social Sciences (NOS-SH). These bodies process current initiatives in their respective fields and put them into action through joint action plans.

The new NordForsk strategy for 2015–2018 stresses the importance of Nordic cross-border research and research infrastructure cooperation as well as the positive impacts this will have on evidence-based policy-making. The first strategic priority is supported by the research programmes launched by NordForsk. Funding for these programmes comes from both NordForsk and through national Nordic funding agencies, and administration of the calls rests with NordForsk. The Academy has been actively involved in the preparation and funding of NordForsk programmes. Finnish researchers have had good success with their appli-

cations for NordForsk funding.

In 2014 the Academy provided financing jointly with other funding bodies for projects selected for participation in the following research programmes: eScience, Education for tomorrow, Nordic e-Infrastructure Collaboration (NeIC) and Societal Security.

The Academy was also involved in funding the Nordic Top-level Research Initiative (Toppforskningsinitiativet, TFI). Launched in response to an initiative by the Nordic Council of Ministers, this is the largest joint Nordic research and innovation project to date in the area of climate, energy and the environment. Under TFI, Nordic Centres of Excellence as well as several research networks and research projects received funding through six separate programmes. The budget for the five-year initiative was 50 million euros. The final evaluation of TFI was carried out in late 2014.

In summer 2014, Vice President for Research at the Academy, Professor Marja Makarow was appointed Chair of the NordForsk Board for a two-year term.

## OTHER INTERNATIONAL COOPERATION

Horizon 2020, the European Union's new funding programme for research and innovation, started up in 2014. The Academy of Finland is Finland's national Horizon 2020 contact organisation together with Tekes.

The Academy was actively involved in European Joint Programming Initiatives and represented Finland in the strategic advisory board for six initiatives and took part as a member of the national support group in three other initiatives. Furthermore, the Academy contributed to ERA-NET, INCO-NET and NORIA-NET, and EURAXESS, the Researchers in Motion network.

The Academy is also active in other international research organisations such as Science Europe, the European Science Foundation (ESF), European Cooperation in the Field of Scientific and Technical Research (COST), the European University Institute (EUI), the European Southern Observatory (ESO), the European Organization for Nuclear Research (CERN), the Facility for Antiproton and Ion Research in Europe (FAIR), the European Molecular Biology Laboratory (EMBL) and the European Molecular Biology Conference (EMBC), OECD committees and working groups, UNESCO science programmes, and IGLO, an informal network of Brussels-based national R&D liaison offices.

For more on the Academy's international activities, go to <http://www.aka.fi/en/research-and-science-policy/international-cooperation/>.

# APPENDICES

[BOARD MEMBERS](#)

[MANAGEMENT](#)

[RESEARCH COUNCIL MEMBERS](#)

[ACADEMY PROFESSORS](#)

[FIDIPRO PROFESSORS](#)

[ACADEMIANS OF SCIENCE](#)

[CENTRES OF EXCELLENCE IN RESEARCH](#)

[ACADEMY-FUNDED PROJECTS THAT STARTED IN 2014 \(PDF\)](#)

[ACADEMY-FUNDED PROJECTS THAT ENDED IN 2014 \(PDF\)](#)