



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

Annual Report on the ERC activities and achievements in 2016

Prepared under the authority of the
ERC Scientific Council

RESEARCH & INNOVATION
POLICY



European Research Council

Established by the European Commission



EUROPEAN COMMISSION

Annual Report on the ERC activities and achievements in 2016

ERC
European Research Council



European Research Council

Established by the European Commission

2017

EUR 28487

**Europe Direct is a service to help you find answers
to your questions about the European Union.**

Freephone number (*):

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

LEGAL NOTICE

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information.

The views expressed in this publication are the sole responsibility of the author and do not necessarily reflect the views of the European Commission.

More information on the European Union is available on the internet (<http://europa.eu>).

Luxembourg: Publications Office of the European Union, 2017

ISBN 978-92-9215-048-8 (print version); ISBN 978-92-9215-047-1 (PDF version)

doi:10.2828/980974 (print version); doi:10.2828/37878 (PDF version)

ISSN 1831-239X (print version); 2363-2593 (PDF version)

ISSN Collection 1018-5593 (print version); 1831-9424 (PDF version)

© European Union, 2017

Reproduction is authorised provided the source is acknowledged.

Photo credits:

© European Union, 2017

© www.shutterstock.com

© www.istockphotos.com

Printed in Luxembourg

PRINTED ON RECYCLED PAPER



Highlights - 2016 in review 11

Research highlights 31

Advancing frontier research 49

ERC Scientific Council and Executive Agency 59

Annexes 75

Contents





Commissioner's introduction

Since 2007, ERC's investment in frontier research has enabled breakthrough discoveries and planted the seeds for future innovations that address key scientific and societal priorities.

In 2016 the ERC celebrated one more Nobel laureate among its grantees, the sixth. Bernard L. Feringa, who received an ERC grant in 2008 and a second one in 2015, has been awarded the Nobel Prize in Chemistry for 2016 jointly with Jean-Pierre Sauvage and Sir J. Fraser Stoddart for the design of the world's smallest molecular-machines.

These scientists have taken chemistry into a new dimension, and this outstanding work is an excellent example of cutting-edge European science. I am proud to see that EU support has enabled them to push the frontiers of human knowledge that will ultimately benefit the society and economy. In his Nobel Lecture, Feringa emphasised the role of the European Research Council in generously supporting researchers with funds for fundamental science, so crucial for their work, where they are trying to lay the foundation for the technologies of 30/40/50 years from now on.

Feringa was the first in 1999 to develop a molecular motor spinning continually in the same direction. But the first step towards a molecular machine goes back to 1983 with Sauvage, followed by Stoddart in 1991. This is the proof, if that was necessary, that a Nobel Prize is the result of a long-term investment and of an environment favourable to curiosity-driven research. And this is exactly what the fundamental activity of ERC is: provide attractive long-term funding to support excellent researchers pursuing the ground-breaking research that they independently decide to explore.

But there is more in a Nobel Prize than recognition of academic, cultural, and scientific advances. Very often the benefits for the society and the economy still have to come.

The Nobel committee referred to the work of the three prize winners as a breakthrough comparable to the electric motor in the 19th century. They wrote that "in terms of development, the molecular motor is at the same stage as the electric motor was in the 1830s, when scientists displayed various spinning cranks and wheels, unaware that they would lead to electric trains, washing machines, fans and food processors."

We can now only imagine what the molecular machines will lead to in the future: development of new materials, sensors and energy storage systems, just to mention a few.

I like the way the Nobel committee describes the work of researchers producing scientific breakthroughs, unaware that their discoveries would ultimately lead to innovations that create entirely new markets. Their disruptive scientific advances might just be the starting point of a long process.

To maintain the comparison with the electric motor, think for example of Tesla Inc, the company named after electrical engineer and physicist Nikola Tesla. Their first electric sport car, which gained the company world-wide attention in 2008, uses an electric motor driven by an alternating current descended directly from Nikola Tesla's original 1882 design.

This looks like a very long time from the physicist's lab to a company that is today dominating the advanced electric car sector. But it is also a clear example of how a long-term investment in frontier research may lead to the emergence and growth of companies that can create and dominate totally new markets. And that's what Europe needs. To get there, it takes a complex systemic process, a fundamental part of which often begins with science in the lab. The European Commission's efforts to prioritise and support curiosity-driven frontier research through the European Research Council are essential to ensure that the whole process does not dry out.



Carlos Moedas
*European Commissioner for Research,
Science and Innovation*



Personal message from the ERC President

The year 2016 is already the third year of Horizon 2020, the European Commission seven-year programme to support research and innovation. This is to say that a certain steady state has been reached with close to 8 000 applicants in the year for around 950 grantees, with the reiterated priority given by the Scientific Council from the very beginning of the ERC to researchers in the early part of their career.

This is one more year during which ERC successfully attracted ambitious proposals and high level evaluators performing a thorough selection process which does leave a number of applicants frustrated in view of the tough competition and the limited resources. Indeed, once again, ERC could have funded 500 grantees more without significantly lowering the scientific quality. This is one more year during which the Executive Agency in charge of the management of the ERC delivered all what it is committed to with a high level of satisfaction of users, meeting the highest standards in terms of efficiency, reliability and accountability, as attested by an independent external study.

In 2016 one more ERC grantee was distinguished with the Nobel Prize, in Chemistry this time. In his lecture during the Nobel week Professor Ben Feringa very explicitly stressed the importance that the freedom he gained from his ERC grants played in his successful quest for the understanding of molecular motors which have a fundamental role in living organisms.

For the Scientific Council it was very important to perform an ex-post evaluation of the first projects supported by the ERC as soon as they were completed. The first exercise took place in 2015. It was repeated in 2016 when around 200 projects were examined by 75 evaluators who were asked, from the scientific report, the publications, the patents and other achievements, to classify the outcome in four categories: breakthroughs, major scientific advances, incremental scientific advances and limited results. The results of this evaluation have been very impressive with 25 % breakthroughs, 48 % major scientific advances and only 1 % insignificant results. They also gave indications on the impact, scientific and broader, the projects have achieved. Similar evaluations will be conducted every year on samples of the same size, since the growing number of ERC-funded projects makes an exhaustive evaluation of all completed projects too daunting an endeavour.

In 2016 the ERC continued to develop its international relations with the signature of implementing arrangements with Brazil and Canada. Efforts to have more countries to join have been made and should hopefully bear fruit in 2017.

In April, the Scientific Council held a plenary meeting in Copenhagen with a half-day retreat dealing with the main challenges the ERC is facing: interdisciplinarity; widening European participation; gender balance, and its future structure.

After a thorough study of the first years of activity of the Synergy Grants funded in 2012 and 2013, the task force put in place by the Scientific Council concluded that it would be worthwhile for the ERC to relaunch a Synergy programme. Still based on a strict bottom-up approach, it would allow teams of up to four Principal Investigators to apply for grants in order to tackle more ambitious projects requiring their collaboration. These conclusions were endorsed by the Scientific Council in its plenary meeting held in Dublin in October 2016 with the ambition of including such a call in the Work Programme 2018.

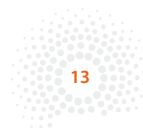
As it has become a tradition, plenary meetings held outside Brussels were great occasions for members of the Scientific Council to interact with scientists and local authorities. Three other plenary sessions were held in Brussels: in February, June and December.

This year saw the first steps of implementation of the two projects led by the ERCEA communication unit in an effort to reach a broader public: one called ERC=Science² has developed mobile exhibits on ERC projects dealing with the following themes: Humane cities and Food; the other one called ERCCOMICS has produced the first webcomics based on stories inspired by ERC projects. The promotion of ERC was once more done through the presence of ERCEA staff at a number of congresses and conferences. Many ERC grantees have been involved in this effort through lectures, presentations and participations to debates. Here are a few events worth being highlighted because of the significant presence of ERC grantees: the World Economic Forum in Davos, Switzerland, the Annual meeting of the American Association for the Advancement of Science in Washington, United States of America, the Annual Meeting of New Champions in Tianjin, People's Republic of China, the EuroScience Open Forum in Manchester, UK, and several events in an effort to widen participation in Europe held in Poland, Slovenia and Slovakia.

During this year the commitment of all those who contribute to the ERC to achieve its goal of supporting ambitious projects initiated by scientists has been full. There is more and more evidence of achievements by ERC grantees from numerous great contributions to basic and applied science to the creation of some start-ups.

Prof. Jean-Pierre Bourguignon
ERC President and Chair of its Scientific Council





1.1 Mission

The European Research Council (ERC) was created under the 2007-2013 European Communities framework programme for research and development (FP7) and is continuing its activities pursuant to the Specific Programme implementing the Horizon 2020 framework programme. Composed of an independent Scientific Council and a dedicated implementation structure in the form of an Executive Agency (ERCEA), the ERC has rapidly gained wide recognition as a world-class research-funding agency and has attained an excellent reputation within the scientific community across Europe as well as worldwide.

Inspiring other funding organisations and policy makers, and having established itself as an essential component of the European Union's research-funding landscape, its label of excellence has raised the level of science across Europe. Supporting the best researchers, in any field of research, on the sole criterion of scientific quality aiming at excellence is expected to have a direct impact through advances at the frontiers of knowledge, opening the way to new scientific and technological results that can lead to innovation.

Three grant schemes form the core of the ERC activities: Starting Grants (StG) support researchers at the early stage of their careers, with the aim of providing working conditions enabling them to become independent research leaders; Consolidator Grants (CoG) support researchers who are at the early stage of their careers but often already working with their own group (while the 'starters' are usually still in the process of setting up their own research group); and Advanced Grants (AdG) are designed to support outstanding and established research leaders by providing them with the resources necessary to continue the work of their teams in expanding the frontiers of scientific knowledge.

An increasing, though still modest, part of the ERC budget is dedicated to the Proof of Concept Grant (PoC), which offers ERC grant holders the possibility to establish the innovation potential of ideas stemming from their existing ERC grants. This funding scheme is aimed at helping to bridge the gap between research and social or commercial innovation and is evaluated by professionals in the translation of research.

The ERC Work Programme, which is established annually by the Scientific Council – the ERC's governing body - and adopted by the European Commission, aims at reinforcing excellence, dynamism and creativity in European research by providing attractive, competitive and long-term funding to support the best investigators and their research teams to pursue ground-breaking, high-risk, high-gain research.

By offering to researchers an open space for submitting their most ambitious projects, the ERC has a fundamental role in reinforcing and making the whole system of research and innovation more engaging for them. Its curiosity-driven, competitive approach has allowed the ERC to fund a broad portfolio, with a number of cross-disciplinary projects. The ambition is to lay the foundations for developing the next generation of researchers ready to address future, unpredictable challenges that the European society may face.



1.2 Main outcomes in 2016

For the seven year period of the Horizon 2020 programme, the ERC's budget is EUR 13.1 billion. This represents around 17 % of the entire Horizon 2020 budget. For 2016, the total annual budget was EUR 1.67 billion. After three years with a budget lower than the one of FP7 last year, the call budgets will be gradually increasing each year from 2017 on.

In 2016, commitment credits of EUR 1.67 billion and payment credits of EUR 674 million were fully executed.

The ERC calls from the 2016 Work Programme for the core ERC grant schemes (StG, CoG and AdG) yielded a total of 7 644 proposals, representing a 10.4 % increase compared to 2015 (1 % increase for Starting, 12 % increase for Consolidator and 23 % increase for Advanced Grants). 374 Starting and 314 Consolidator projects have been selected for funding through a rigorous peer review process, bringing the total to over 2 500 ERC Horizon 2020 grantees. The Advanced Grant 2016 proposals were still under evaluation at the moment of printing this report. The evaluation process was organised as usual into 25 different evaluation panels per call, involving more than 2 400 panel members and 15 800 external reviewers over the first 3 years of Horizon 2020.

At the same time, 437 proposals were submitted to the PoC 2016 call with three deadlines (an increase of 29 % compared to 2015), of which 133 projects have been selected for funding.

ERC-funded projects are highly productive and ERC-funded research is largely present in high-impact journals. By December 2016, the ERC grantees had reported almost 100 000 publications in their project reports.

The efficient operation of all the calls during 2016 underlines the successful organisational development of the ERCEA, which at the end of 2016 counted 461 staff members, a small number in view of the tasks to be performed.

1.3 Highlights – 2016 in review

ERC advocates cutting-edge research in Davos

From 20 to 22 January 2016, the ERC took part once again in the World Economic Forum organised in Davos to discuss how blue sky research brings about innovation.

The World Economic Forum, which has taken place annually since 1971, is one of the most recognised platforms for discussion of pressing global issues. With the overarching goal to “improve the state of the world”, the forum gathers over 2 500 participants, bringing together political, business, scientific and civic society leaders from around the world.

Amongst other leaders, European Commissioner for Research, Science and Innovation Carlos Moedas and ERC President Jean-Pierre Bourguignon participated to underline Europe’s efforts to attract top scientists.

At the summit, the ERC was also represented by 13 of its funded researchers who spoke in 16 sessions showcasing their research. Amongst them, there were two renowned economists: Prof. Hélène Rey, who shared her expertise in global financial cycles, and Nobel Prize winner Prof. Sir Christopher Pissarides, who gave his insights into unemployment. The ERC also held an IdeasLab session with four grantees discussing the future of computing.

© World Economic Forum/swiss-image.ch/Photo Michele Limina



President Jean-Pierre Bourguignon, Commissioner Carlos Moedas and grantee Helene Rey at 2016 World Economic Forum in Davos.



Speaking to the press at the World Economic Forum

Prof. Hélène Rey's research has focused on the functioning of the International Monetary System, the determinants and consequences of external trade and financial imbalances, the theory of financial crises, capital flows and the behaviour of the financial sector. In particular, she has analysed the international transmission of US monetary policy via asset markets around the world and the degree of monetary independence enjoyed by emerging markets as well as advanced economies.

She has demonstrated that countries' gross external asset positions help predict current account adjustments and the exchange rate. The research, having potential implications for the conduct of monetary and macroprudential policies, has raised interest from academics, central banks and policy makers.

Named "The economist to watch in 2016" by The Economist, Professor Hélène Rey has also received numerous prestigious awards in her field. She received an ERC Advanced Grant in 2016. Prior to that, she was awarded an ERC Starting Grant in 2007, which encouraged her to return to Europe from Princeton University, where she was a Professor.

She is on the board of the Review of Economic Studies and associate editor of the AEJ: Macroeconomics Journal. She is a Fellow of the British Academy, of the Econometric Society and of the European Economic Association. Prof. Rey is a member of the Board of the French Macroprudential Authority. She writes a regular column for the French newspaper Les Échos.

Prof. Hélène Rey was a speaker in the ERC press conference at the World Economic Forum Annual Meeting 2016.

Researcher: Hélène Rey, London Business School (United Kingdom)

ERC Projects: Countries' external balance sheets, dynamics of international adjustment and capital flows (IFA DYNAMICS) + International Finance and Monetary Policy (INFIMOP)

ERC funding: ERC Starting Grant 2007, EUR 1.3 million (2008-2013) + Advanced Grant 2015, EUR 1.8 million (2016-2020)

ERC at Summer Davos: the role of research in the Fourth Industrial Revolution

The ERC participated in the tenth edition of the Annual Meeting of the New Champions (AMNC), held in Tianjin, China, from 26 to 28 June 2016, with President Jean-Pierre Bourguignon, Vice President Mart Saarma and 12 ERC grantees, who shared their latest scientific findings. Six of them are part of the World Economic Forum's Young Scientists Programme.

The AMNC, also known as Summer Davos, is the main global event on science, technology and innovation, gathering young leaders from academia, fast growing enterprises, government and civil society, as well as the media, of over 90 countries. The 2016 edition addressed the topic of "the Fourth Industrial Revolution and its transformational Impact".

The 12 ERC grant winners shed light on topics ranging from antimicrobial resistance, bacterium-sized robots for drug delivery and quantum physics, to stem cell biology and fertility. The ERC Ideas Lab focussed on emerging strategies to fight drug-resistant infections and on the future of antibiotics.

Global Research Council 2016

ERC President Jean-Pierre Bourguignon also participated in the 5th annual meeting of the Global Research Council (GRC), held in New Delhi (India) on 26 and 27 May and jointly hosted by Research Councils UK (RCUK) and the Indian Science and Engineering Research Board (SERB).

The GRC is a discussion forum for heads of research funding agencies from around the world to share best practice and learn from each other. The meeting was attended by more than 100 delegates, with over 50 heads of Research Councils participating from around 45 countries. The two topics for the annual meeting were 'Interdisciplinarity' and 'Equality and Status of Women in Research', both of which built on previous GRC discussions and statements.

The summit, that had been prepared through five regional meetings, discussed and endorsed a Statement of Principles on Interdisciplinarity and a Statement of Principles and Actions Promoting Equality and Status of Women in Research. Through these, funding agencies worldwide are provided with a set of principles and a collection of potential implementing actions to create an environment enabling investments in and support to interdisciplinary research, and to promote improved equality and diversity practices within their own countries.

The ERC at ESOF 2016

From 24 to 26 July 2016, the ERC participated in the EuroScience Open Forum (ESOF) in Manchester (UK), with President Jean-Pierre Bourguignon, Vice President Klaus Bock, Scientific Council members Athene Donald and Thomas Jungwirth, as well as over 40 ERC grantees. More than half of the grantees present in Manchester took part in nine ERC sessions covering subjects as diverse as women in science, personalised medicine, the Earth's deep interior, interactions between humans and microbes, the resistance of micro-organisms to antibiotics, the ability of machines to mimic human cognitive capacities, two-dimensional materials and preventive medicine. ESOF, held once every two years, is a showcase for excellent European science. The forum brings together over 4 500 leading thinkers, innovators, policy makers, journalists and educators from more than 90 countries, to discuss current and future breakthroughs in contemporary science.



New weapons in the fight against antibiotic resistance

Antibiotics are amongst the most crucial discoveries in modern medicine. However, the surge in microbial resistance to these, now common, drugs is a challenge that medical researchers work hard to tackle. Prof. Susanne Häußler, who was one of the ERC grantees presenting her research at ESOF 2016, believes early diagnostic tools could shift the paradigm of how we battle this problem.

Antimicrobial resistance is the phenomenon of the decade, increasing medical expenses, morbidity and costing the European Union alone 25 000 deaths per year. The rush to discover new antibiotics has slowed dramatically, with trials for new compounds becoming rarer and less effective. This is an arms race between microbes and human beings, and Prof. Häußler believes that the solution may come from shifting the war from new drugs to better diagnostics.

In her project RESISTOME, Prof. Häußler uses a multi-disciplinary approach that combines work on clinical bacterial isolates with state-of-the-art biomolecular research, next generation-sequencing and array technology, to uncover all genetic determinants of antibiotic resistance. Her work aims at characterising the differences between resistant and non-resistant bacteria, to improve diagnostic instruments.

By working specifically on the common bacterium *Pseudomonas aeruginosa*, associated with many antibiotic resistant infections, for example in hospital patients and in cystic fibrosis sufferers, Prof. Häußler was able to observe very distinct gene expression profiles in resistant bacterial strains. This work will be the basis for the development of techniques for the early detection of resistance. This should allow treatments to become more personalised, avoiding the indiscriminate use of ineffective antibiotics.

Researcher: Susanne Häußler, Helmholtz Centre for Infection Research (Germany)

ERC Project: Towards an individualised therapy and prevention of multi-drug resistant disease (RESISTOME) + Rapid Antimicrobial susceptibility testing and phylogenetic Identification (RAPID)

ERC funding: Starting Grant 2010, EUR 1.5 million (2010-2015) + Proof of Concept 2015, EUR 150 000 (2016-2018)

ERC – Open to the World

ERC President at Next Einstein Forum, Senegal

On 10 March 2016, Jean-Pierre Bourguignon spoke at the Next Einstein Forum Global Gathering in Dakar, Senegal, his first visit to Africa as President of the ERC. This new forum for science aims to propel Africa into the global scientific landscape. Under the campaign “ERC - Open to the World”, the ERC took the occasion to breathe new life into its original mission to make Europe attractive to the brightest minds worldwide and to encourage global scientific exchange.

At this first global gathering of the Next Einstein Forum, held with the theme ‘Connecting Science to Humanity’, some 500 outstanding thinkers, policy makers, journalists, civil society representatives, business people and entrepreneurs from around the world gathered to highlight breakthrough discoveries and catalyse scientific collaboration for human development. This meeting also showcased 15 of Africa’s top young scientists and connected them with leaders from Africa and the rest of the world. The ERC President was a scientific member of the committee which selected them. The forum, to be held every second year, was launched by the African Institute for Mathematical Sciences (AIMS) in partnership with the Robert Bosch Stiftung.

ERC visits India to promote funding opportunities

As part of the awareness raising campaign, “ERC - Open to the World”, to promote the ERC to the global scientific community, from 23 to 27 May, President Bourguignon visited India to raise awareness amongst top Indian scientists about funding opportunities in Europe.

Since 2007, the ERC has awarded over EUR 12 billion to almost 7 000 scientists and scholars from all over the world, both early-career and senior. Of these, 38 are Indian researchers working in prestigious institutions across Europe. The ERC wishes to see this number increase.

Whilst in India, the ERC visited several prestigious universities and research institutes in Bangalore and New Delhi to present its attractive funding to both researchers and university representatives.

As the visit also served to foster relations with Indian research funding bodies, the ERC President met with officials from Indian Ministries such as the Science and Engineering Research Board (SERB) and the Department of Biotechnology (DBT) of the Ministry of S&T to discuss ways to promote greater scientific exchange between ERC grantees and Indian researchers.

Initiative to help talented Brazilian and Canadian researchers join ERC teams in Europe

On 13 October, an initiative that will foster international collaboration between top Brazilian and ERC-funded researchers was launched in Brussels. The Commissioner for Research, Science and Innovation, Carlos Moedas, and the President of the Brazilian National Council of State Funding Agencies (CONFAP), Sergio Luiz Gargioni, signed the deal in the presence of Klaus Bock, ERC Vice-President. This agreement is set to encourage young Brazilian scientists to join the teams of ERC grantees, conducting frontier research across Europe.

On 28 October, a new deal between Canada and the European Union was concluded to encourage talented Canadian researchers to join ERC teams in Europe. Commissioner Moedas and the President of the Social Sciences and Humanities Research Council of Canada Ted Hewitt signed the agreement at an event in Brussels, with ERC President Jean-Pierre Bourguignon as host. Also in attendance was the President of the Natural Sciences and Engineering Research Council of Canada B. Mario Pinto.

These agreements, called 'implementing arrangements' resonate with the overall "ERC - Open to the World" strategy. The ERC awards grants to researchers of all nationalities if they undertake their projects in the countries of the European Research Area (ERA) that includes EU Member States and Associated Countries. It is important to enhance awareness of such possibilities among non-European researchers and to facilitate them in joining an ERC-funded project. Therefore these agreements have as goal to enable non-European top researchers to undertake research visits and cooperate with ERC-supported teams in Europe.

Similar agreements were signed in the past with the US (National Science Foundation, NSF), South Korea (National Research Foundation of Korea, NRF), Argentina (National Scientific Technical Research Council, CONICET), Japan (Japan Society for the Promotion of Science, JSPS), China (National Natural Science Foundation of China, NSFC), South Africa (National Research Foundation, NRF) and Mexico (Mexican National Council of Science and Technology, Conacyt).

ERC conference on Frontier Research and Science Diplomacy

In a world where many global and regional challenges cannot be addressed by a single country, science becomes an important driver of international cooperation. The ERC shed light on the intersection of science and international relations in its two-day conference "Frontier Research and Science Diplomacy" in Brussels from 27 to 28 October.

ERC President Jean-Pierre Bourguignon, European Commissioner for Research, Science and Innovation Carlos Moedas, political representatives from the EU, the UN, UNESCO, as well as ERC-funded top scholars shared their insights in the thriving field of science diplomacy. They showed how science can address topics such as security, sustainable development and health on a global scale. By engaging with their counterparts in sharing experience and resources, researchers greatly contribute to exchange and understanding across nations and cultures.

ERC grantees present at the conference included Mary Kaldor, who contributes to the European security strategy of the EU High Representative Federica Mogherini; Eyal Benvenisti, an expert in diplomacy, law and global interdependence who spoke about how diplomacy is changing; Graeme Barker, an archaeologist working in Northern Africa and the Middle East, who shared his experience of on-site access in conflict zones, and many more.



Addressing the 21st century security gap

Mary Kaldor, Professor of Global Governance at the London School of Economics and Political Science (LSE), believes that the twentieth century model of security, based on the rule of law and policing within nation-states and conventional military forces externally is no longer applicable to the twenty-first century global security risks.

The concept of “security gap” that she focuses on in her research refers to the fact that millions of people live in situations of intolerable insecurity as a consequence of armed conflict, organised crime, terrorism, financial crisis, poverty and inequality, environmental degradation, vulnerability to natural disasters to name but a few. Yet, current public security provisions are not designed to address these sources of insecurity and, as recent wars in Iraq and Afghanistan have shown, sometimes make them worse. Her ERC project is about investigating and identifying the nature of the security gap and tracking the ways in which public and private agents are adapting.

Before joining the LSE, Mary Kaldor worked at the Stockholm International Peace Research Institute (SIPRI) and the University of Sussex, including the Science Policy Research Unit. She is the author of several books, including ‘The Baroque Arsenal’, ‘The Ultimate Weapon is No Weapon: Human Security and the Changing Rules of War and Peace’, ‘New and Old Wars: Organised Violence in a Global Era’ and ‘Global Civil Society: An Answer to War’. She was co-chair of the Helsinki Citizens Assembly, a member of the International Independent Commission on Kosovo and convenor of the Human Security Study Group, which has been reporting to the High Representatives for EU Common Foreign and Security Policy Javier Solana and Federica Mogherini.

Researcher: Mary Kaldor, London School of Economics and Political Science (United Kingdom)

ERC Project: Security in transition: An Interdisciplinary Investigation into the Security Gap (SIT-SG)

ERC funding: Advanced Grant 2010, EUR 2.3 million (2011-2016)

Widening participation in ERC competitions

ERC sets guidelines for national and regional fellowships to visit ERC projects

On 19 January 2016, the ERC published guidelines for national or regional authorities and other organisations that wish to set up fellowship programmes to fund short-term visits of potential ERC applicants to current ERC-funded teams¹.

Countries eligible to host ERC grants may consider introducing such schemes to stimulate and help their researchers fare better in ERC grant competitions. The ERC welcomes such initiatives by facilitating and streamlining the process.

The guidelines recommend that fellowship programmes notified to the ERC are open to researchers of all disciplines and are based on transparent evaluation with scientific excellence as the main criterion and final selection based on the applicants' potential to be awarded an ERC grant. The programmes should require the visitors to apply for an ERC grant within a specified time after the visit. Costs, such as travel and salary pertaining to these visits, should be covered by the scheme organisers.

The ERC will recognise the fellowship schemes that follow the guidelines, and will promote them among grantees, facilitating exchange of information between grantees and scheme organisers.

The ERC Scientific Council believes that increasing the international exposure of researchers can help them develop their potential before applying for an ERC grant.

In response to this initiative, the Czech Science Foundation (GACR), the Estonian Research Council (ETAg), the National Research, Development and Innovation Office (NKFIH) in Hungary, the National Science Center (NCN) in Poland, the Slovenian Research Agency (ARRS), and the Research Foundation - Flanders (FWO) in Belgium were the first to organise fellowships for such research visits and more organisations are expected to follow suit.

The ERC has in the meantime informed some 2 800 of its grantees, those with 18 months or more left on their project, about a call for expression of interest regarding the new fellowship programmes, encouraging them to host visitors. About 25 % of ERC grantees have responded positively to the call and these are now waiting for the potential visitors to approach them with their proposals for the visits, which are to take place in 2017. The outcome of this initiative on widening European participation will show results in the 2018 calls, when the first cohort of visiting fellows will complete their visits and will start to apply for ERC grants.

Promoting research excellence through EEA and Norway Grants with the ERC

The EEA Grants and Norway Grants represent the contribution of Iceland, Liechtenstein and Norway to reducing economic and social disparities and to strengthening bilateral relations with 16 EU countries in Central and Southern Europe and the Baltics. These countries also show weak participation in ERC competitions.

Following a joint initiative by the Norway Research Council and the ERC, the EEA and Norway grants programme for the period 2014-2021 will facilitate the support of ERC runners-up through its own funds. The initiative, referred to as "Promoting Research Excellence through EEA&NORWAY

¹ https://erc.europa.eu/sites/default/files/document/file/Fellowship_Visit_ERC_Grantee.pdf

Grants with the ERC", will allow national authorities in beneficiary countries to fund their national unsuccessful ERC applicants directly from the EEA and Norway grants fund, simply on the basis of their ERC evaluation outcome.

As part of this new initiative, the below three different schemes (depending on the ERC evaluation outcome) are proposed to the beneficiary countries for their adoption as part of their bilateral EEA and Norway Grants research programme.

Excellence Grants for runners-up

Proposals recommended for funding, but not funded due to lack of sufficient ERC funds (non-funded Step 2 As) in AdG, CoG and StG calls can receive:

- > full funding of their ERC proposed project, coupled with a short term visit/exchange to/from donor State.

Maturing Excellence Grants

Proposals meeting some but not all elements of the ERC's excellence criterion, and therefore not funded (non-funded Step 2 Bs) in AdG, CoG and StG calls can receive:

- > 3-24 months funding for further development of proposals supported by a mentoring scheme and coupled with a short term visit to an ERC or Center of Excellence (CoE) research group in a donor State and optionally also in a third country.

Nurturing Excellence Grants

Proposals of high quality but not sufficient to pass to step 2 of the ERC evaluation (non-funded Step 1 Bs) in CoG and StG calls can receive:

- > 3-6 months mobility funding aiming to improve the ERC proposal during a short term visit to an ERC or CoE research group in a donor State, and optionally also in a third country.

The ERC Scientific Council welcomed the initiative by hoping that many of the beneficiary countries would seize the opportunity and take advantage of this possibility aiming at capacity building in frontier research across Europe's less research intensive countries and helping excellent researchers based there to become more competitive in ERC calls.

ERC regional widening participation events

ERC widening events are becoming a well-established instrument of the Scientific Council Working Group on widening European participation, with three new ones taking place in 2016. These cross border scientific and science policy meetings which target ERC stakeholders in regions with a weak ERC participation go beyond communicating the ERC funding opportunities. They address the importance of national and institutional support for the success in ERC competitions. They offer a floor for systematic debate and interactions between the ERC Scientific Council members and relevant national and institutional stakeholders on how to better support frontier research, nurture scientific excellence, and strengthen the level of competitiveness in ERC competitions. The events provide

an all European forum of dialogue, exchange of experiences, networking, and learning about best practices of local support for the promising scientists in Europe's weak research-performing regions.

The first event was organised under the auspice of the Polish National Science Centre, a governmental research funding agency set up in 2010 following the model of the ERC, on the occasion of its 5th anniversary. The event, entitled "Widening participation to ERC calls: the role of initiatives such as the EEA and Norway Grants", took place on 3 March in Krakow (Poland) with discussions focused around different options to use EEA and Norway Grants funds to support ERC runners-up on the national level, the joint initiative of the ERC and Norway Research Council described above.

The second event taking place on 14 November in Wroclaw (Poland) and co-organised by the Wroclaw Hub of Academia Europaea addressed challenges related to applying for an ERC grant from a perspective of young researchers working in EU13 countries. Scientific Council member Eva Kondorosi, in her capacity as chair of the ERC Working Group on widening European participation, gave an opening talk which was followed by a high level panel discussion on the local, institutional issues of low participation in the ERC competitions and by testimonies of young scientists about their experience of applying to ERC.

The third and largest ERC widening event of the year, with the title "ERC Funding Opportunities: Supporting excellent researchers all over Europe", took place in Ljubljana (Slovenia), on 2 December, and was organized jointly with the Ministry of Education, Science and Sport, Republic of Slovenia. The event addressed the broader Western Balkans region, including representatives from Slovenia, Croatia, Bosnia and Herzegovina, Serbia, the Former Yugoslav Republic of Macedonia, Montenegro, Albania, Romania, Bulgaria, all showing weak application and success in ERC competitions. It assembled three members of the ERC ScC (President Jean-Pierre Bourguignon, Eva Kondorosi and Nils Stenseth), several members of the national science ministry cabinets, and over 130 representatives of the research and science administration community in the region to discuss their national and institutional perspectives on challenges and solutions for a stronger participation in ERC competitions. A dedicated meeting on EEA and Norway Grants funding opportunities with the ERC was also organised for the representatives of the present beneficiary countries at the margins of this event.

Continued commitment and support to Open Access

In February 2016 the ERC formally announced its cooperation with the OAPEN Foundation in furthering open access to academic books and book chapters. The OAPEN library provides a platform for the full-text dissemination of open access books from all scientific areas, in particular in Social Sciences and Humanities. With the help of an ERC grant, during the course of 2016, the OAPEN Foundation has developed a tailor-made deposit service for ERC funded authors.

Also in February, the ERC Scientific Council Working Group on Open Access, together with STM (International Association of Scientific, Technical and Medical Publishers) organised a seminar on "Open access licencing". The event brought together several ERC grantees, representatives from a number of publishers, and about 50 staff members of ERCEA, Research Executive Agency and the European Commission.

On 21 March, the statement of the ERC Scientific Council on the Berlin "Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals" was adopted. This expression of

interest concerns the establishment of an international initiative that aims to transform a majority of today's scholarly journals from subscription to open access publishing in accordance with community-specific publication preferences, while continuing to support new and improved forms of open access publishing. Key aspects of that transformation will be the re-organisation of the underlying cash flows, increased transparency with regards to costs and potential savings, and the adoption of mechanisms to avoid undue publication barriers. In its statement the Scientific Council strongly endorsed the broad aims of the initiative but also raised a number of important issues that need to be taken into account in the transition towards open access.

The 2016 Nobel Prize in Chemistry

The Nobel Prize in Chemistry for 2016 has been awarded to Professors Jean-Pierre Sauvage, Sir J. Fraser Stoddart and Bernard L. Feringa "for the design and synthesis of molecular machines". All three laureates have participated in EU-funded research projects, and Bernard Feringa is also a recipient of two ERC grants.

On this occasion, the ERC President extended warm congratulations on behalf of the ERC Scientific Council to the three Nobel laureates in a happy day for Europe, reminding that Bernard Feringa is the sixth ERC grantee to win this prestigious prize.

Nobel Prize in Chemistry 2016
Prof. Ben Feringa
Advanced Grants 2008 & 2015



Prof. Feringa's pioneer research constitutes a major turning point in synthetic chemistry. Of the size of one nanometre - one billionth of a metre -, Feringa's team has built the world's first light-powered molecular motor that can rotate as a propeller, setting the foundations for the revolutionary nanotechnology of the future.

These molecular nanomachines are inspired by the variety of motors and molecular engines that can be found in many biological systems, including the human body. Evolving from rotary motion to translation motion, i.e. able to move things forward, the new molecules can respond to stimuli from their environment, be employed in the self-assembly of nanostructures, or regulate DNA transcription, with potential applications for the development of self-healing materials, smart drugs, targeted treatments and far beyond.

Research funding organisations are assigned public funds and mandated by public authorities to allocate them to the researchers evaluated (by their reviewers) as the most promising. This makes it necessary to design mechanisms that allow accounting for the use of the public funds, and report on the results and impact of the activities. In addition, the high uncertainty related to (peer review based) research funding decisions calls for continuous monitoring of the funding mechanism to assess if corrective measures are needed.

While the core questions of monitoring and evaluation for funding agencies remain the same (“What have you done with the money?” and “How effective and efficient are the intervention measures?”), the expectations on the reporting have evolved in the last years away from a simplified model (“Which projects do you fund?”) to a more sophisticated one in which emphasis is put on comparative perspectives (with alternative funding mechanisms) with focus on research results and ultimate research outcomes. Addressing those questions requires reliable data and this poses challenges both in terms of burden put on funded researchers to provide information and the resources needed to manage and effectively exploit those data.



ERIS is designed as a web platform and builds around different modules (applications). Currently four applications are available to users: "search", "statistics", "portfolio analysis" and "bibliometrics". The following is a brief presentation of the functionalities of the four applications available.



Search for projects

ERIS allows users to make a search into ERC funded research using “search terms” in specified fields or projects or publications from these grants.

It is for example possible to search for projects with “energy storage” in their title and/or abstract, or projects which publish on “malaria”, even if their abstract does not necessary make reference to the disease. The application also offers more powerful search functionalities such as searching for terms or names with tolerance for misspelling (fuzzy search), ranking results according to pre-defined criteria or combine search terms which should be included or excluded in search results.

The search results are given in the form of a table which can be filtered for example to limit results to a certain funding year. The results can also be exported and users are given the possibility to store them temporarily and thus gradually build a list of projects according to multiple search criteria.

Standard statistics on ERC funding

The “statistics” application provides users with standard statistics about ERC funding. It allows to search for information, for example, on how many projects the ERC has funded in Starting Grants. Or how many grants are currently hosted by research organisations in a certain country. Or what is the average duration of a Consolidator Grant. Answers to these questions are presented in the form of interactive dashboards which allow users to focus on a subset of the data.

In addition to the standard statistics, ERIS also offers the possibility to perform analysis on a wide range of criteria. An example for such an analysis would be to count the number of female applicants from EU 13 countries who have made it to step 2 of the ERC evaluation process by scientific domain.

Portfolio Analysis

The application “portfolio analysis” bundles functionalities that allow users to quickly get an overview of the ERC research funding in certain research areas/disciplines or research topics. ERIS makes use of text analysis to detect topics in projects and classify those projects into selected research

classifications. This would allow users, for example, to find ERC funded projects in the areas of clinical medicine, in the field of “Cardiovascular System & Haematology”. Using external research classification also allows a comparison of the ERC funding portfolio with that of other funding agencies.

Research Results

In addition to data on research funding, ERIS also allows the users to find information on results of funded projects. This includes the listing of publications and patents, but also functionalities to interactively analyse those data. The latter is provided via the menu “bibliometrics” which presents the user with a dashboard on the bibliometric performance of a single project or any set of projects. The data on results are taken mainly from reports submitted by the grantees and they are enhanced by data taken for example from popular science press (and related online news services) or editorial notices to highlight important discoveries and present them in a format easily accessible to the public.

Next steps

At the end of 2016, ERIS was meant for internal use within the ERCEA only, mainly to respond to external inquiries and for policy analysis related work, like preparing briefings or supporting the ERC contribution to the Monitoring and Evaluation of FP7/H2020. In the mid-term, an externally accessible version will be developed. In the longer term, it is planned to expand ERIS data coverage to include for example also relevant data from external sources which can help a better monitoring and reporting of ERC funding activities and their effects and impact.

Qualitative evaluation of ERC completed projects

Over the past 10 years, the ERC has funded research projects aimed at generating research outputs of very high scientific value. It is timely to assess whether this objective has been achieved. As part of its ongoing assessment of funded projects, the ERC has been monitoring the bibliometric impact of the scientific publications generated by the projects. While this provides important insight into the success of projects, it is only one way of measuring accomplishments.

To complement these bibliometric findings, in its 2015 Work Programme, the ERC launched a peer-review-based independent qualitative evaluation of completed ERC projects. Work on this assessment started in 2015, with a pilot exercise that focused on the scientific evaluation of the first 199 completed ERC-funded projects. This ex-post peer-review evaluation was undertaken by independent, high-level scientists who were selected by the ERC Scientific Council. These experts were grouped into evaluation panels aligned in their structure to those dealing with ex-ante regular evaluations. Each panel had three experts, two with experience and one without any previous experience as an ERC panel member.

The evaluators were asked to award projects one of the following four grades: ‘scientific breakthrough’ (grade A), ‘major scientific advance’ (B), ‘incremental scientific contribution’ (C) and ‘no appreciable scientific contribution’ (D). In addition, they were asked to address a series of questions related to scientific impact, new methods, interdisciplinarity and societal and economic impact for each project.

The pilot exercise of 2015 was very successful and laid the basis for the ERC's approach to ex-post evaluation. The researchers who participated in the evaluation provided important feedback that shaped the procedure and fine-tuned the questions. The pilot exercise was followed by the 2016 exercise, and the ERC plans to continue undertaking this qualitative evaluation of completed projects every year. In the 2016 exercise, a random sample of 155 projects was evaluated from a pool of 237 ERC frontier projects concluded before 30 June 2014, excluding those evaluated in the 2015 exercise. One of the conclusions reached after the pilot exercise was that it is important to leave at least two years between the completion of the project and the qualitative evaluation. Time is needed for the impact of the research outcomes of a project to be detectable. Although it varies among research fields, it was considered that two years is a reasonable amount of time for the majority of disciplines.

For each project, the evaluators based their review on the project's description of work, the final scientific report, the project publication list and related bibliometric analysis, the patents, and, where applicable, information on accompanying Proof of Concept grants. Moreover, the evaluators were asked to consider any other information publicly available through online resources. The evaluation consisted of a remote phase, during which the evaluators examined the outcome of the projects assigned to them, followed by a panel meeting in which each project was jointly assessed and an overall consensus grade given. Two written reviews were submitted for each project; in general, these were written by panel members, but in cases in which there was insufficient expertise coverage in the three-member panel, written reviews were provided by ad hoc external experts selected by the panel members.

The project reviews consisted of three main parts: (i) a brief questionnaire addressing the scientific advances made, the level of interdisciplinarity, the impact outside the scientific domain, the high-risk/high-gain nature, and the economic and societal impact (if applicable); (ii) a review text describing and assessing the project findings; and (iii) an overall grade based on the scientific results. The distribution of the overall grades in the two rounds of the qualitative evaluation exercise was very similar. It is shown in Figure 1.

Overall results of the qualitative evaluation exercises of 2015 and 2016

Overall, the 2016 panels concluded that 25 % of the evaluated projects had led to a scientific breakthrough. In addition, 48 % of the projects evaluated were categorised as having led to a major scientific advance. Taken together, 73 % of the evaluated projects were assessed as having led to a major scientific advance or a scientific breakthrough, which is an impressive observation, considering that there was no pre-selection of the projects based on their reported scientific output. These results are in line with those obtained in 2015, where 71 % of projects were classified as having led to a major scientific advance or a scientific breakthrough.

Around a quarter of the projects were given the grades of C or D. Among these, were projects that did not achieve significant results due to the high risk involved in the original research proposal. The overall outcome is consistent with the policy established by the ERC of funding high-risk/high-gain projects. A lack of projects in these categories could have indicated a reluctance of ex-ante evaluation panels to take enough risk when making their funding recommendations.

The results indicate that the selection of projects for funding made eight years earlier was in line with the objectives set out for the ERC. Although these findings cannot be extrapolated to the entire pool of ERC-funded projects, since only a small fraction of these have been evaluated, most of them still being far from completion,

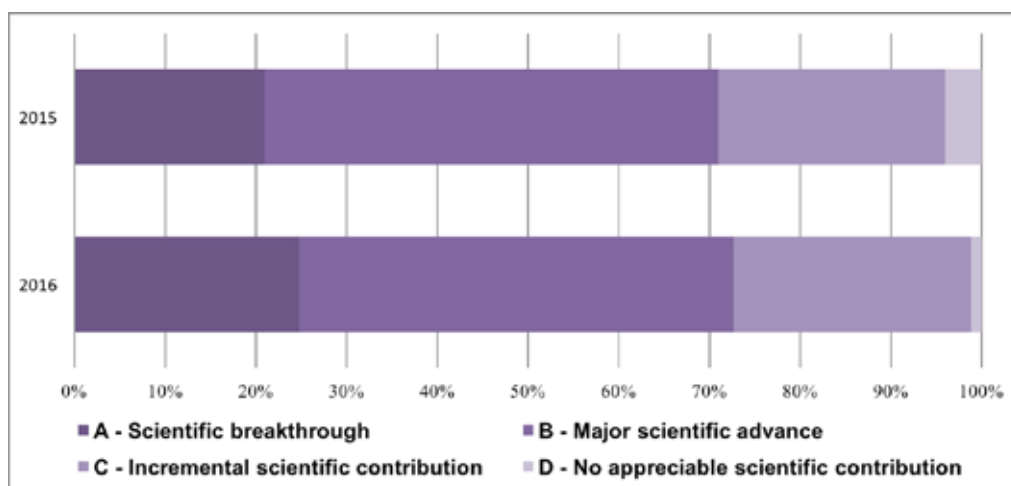
the ERC plans to carry out this exercise every year, which will enable a sound evaluation of the programme. The fact that the results of the two first exercises are similar suggests a certain degree of overall significance.

The evaluation revealed the strong inter-disciplinarity of the projects, also in accordance with the ERC's mission. In both exercises, more than 70 % of the projects have led to results that are applicable, to some extent, to areas of research other than the main focus of the project, or have brought together research areas that previously did not have much interaction. In regards to the impact on the economy, society and on policy making, it was found that close to half of the projects have already had a moderate impact on these spheres and more than three quarters of them will do so, to some extent, in the medium and long term future.

The qualitative evaluation also assessed the high-risk/high-gain nature of the projects judged from the perspective of seven years after funding. According to the evaluators, more than half of the projects examined were high-risk/high-gain projects; there was a strong correlation between this feature and the overall grade of the project. One of the conclusions reached is that ex-ante evaluation panels were able to identify high-risk/high-gain projects and that precisely these projects are the ones generating the most significant scientific results.

Overall, the qualitative evaluation of completed ERC-funded projects carried out by independent experts has shown that the ERC is achieving its goals. The results obtained in these first two exercises complement the findings of the bibliometric analysis of the scientific publications generated by the projects. Both studies lead to the overall conclusion that the research funded by the ERC has a very high impact and is pushing the frontiers of knowledge, opening new avenues of research that are shaping the future of science.

Figure 1: Qualitative Evaluation of completed ERC projects
Overall results for 2015 and 2016







This part of the Annual Report showcases research across the three ERC domains: Life Sciences; Physical Sciences and Engineering; and Social Sciences and Humanities. The aim is to provide a 'snapshot' of the kinds of research the ERC funds. The projects portrayed this year are chosen to highlight not only the excellent science that characterised all of them, but also their different impact in terms of landmark contributions to science, effects on the researchers' careers, translation of science into business or social innovations.

Landmark contributions to science



© QuTech

Addressing critical challenges in quantum applications

After the birth of quantum mechanics in the early 20th century, this branch of physics evolved from being primarily the conceptual framework for the description of subatomic particle phenomena to providing inspiration for new technological applications. New hybrid architecture of quantum systems is now being developed in order to foster the implementation of cutting-edge quantum technologies.

In the 1980s scientists found that the fundamental laws of quantum mechanics can be exploited for the construction of different practical technologies, such as secure communication, high-precision sensing and processing of quantum information. These insights into the vast potential for quantum applications have even evolved into a whole research field of its own, namely *quantum information science*.

Yet, while this field of research has witnessed a rapid development in the past two decades, scientists are still rather far away from accomplishing quantum information processing and quantum computing systems, such as quantum networks linking registers across the globe or full-fledged quantum computers. Until now, the developments were mainly driven by rapidly evolving abilities to experimentally manipulate and control quantum dynamics, ranging from single photons to individual electron and nuclear spins. The rule until recently was that each of these quantum information carriers can execute one or a few specific tasks, but no single system can be universally suitable for all envisioned applications. *Photons*, for example, are best suited for transmitting quantum information and could be used for long distance links between remote registers. *Nuclear spins* are used for storage and core computational tasks, whereas *electronic spins* of defect centres, as one can find them in diamonds, serve as an interface between nuclear spins and photons.

ERC grantee Prof. Ronald Hanson and his team at the Delft University of Technology, are however trying to build the so called *hybrid quantum networks*, where nuclear spins, electron spins, and photons each play the part that suits them best. This could lead to the development of devices that could simultaneously perform several tasks, e.g. reliably store, process, and transmit quantum states.

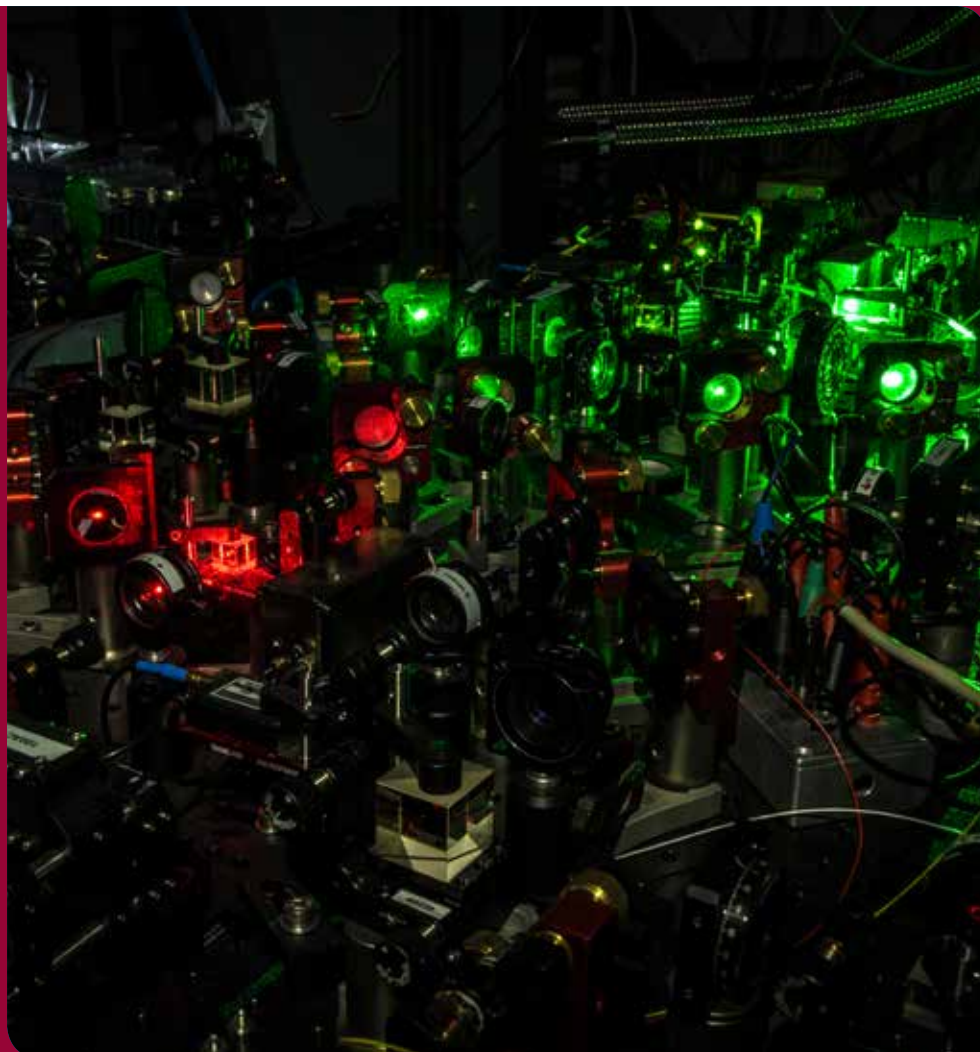
By bringing together theory and experimental techniques from a large range of disciplines, Prof. Hanson is addressing two critical challenges remaining in order to implement quantum information technologies: quantum feedback controls (to correct errors induced by unwanted environmental influences [decoherence] and imperfect manipulation), as well as long-distance quantum networks.

The team hopes, that by solving these challenges, they can uncover a range of new opportunities for fundamental science and future applications, which would have a broad impact on quantum science. By establishing elementary long-distance quantum networks for example, the secure exchange of information over very long distances could be made possible and a pathway for scaling quantum information processors beyond a handful of quantum bits could be achieved.

Researcher: Ronald Hanson, Delft University of Technology (The Netherlands)

ERC Project: Hybrid quantum networks for spin coherent technologies (HYSCORE)

ERC funding: Starting Grant 2012, EUR 1.5 million (2012-2017)



© Klapstuk Studio

Laser setup. Lasers are used to control and readout the electron in the defect center in diamond. The electron serves as an interface between nuclear spins and photons.



Chemical reactions step by step

Chemical reactions are at the core of industrial processes. They are provoked to produce new molecules that will confer the desired properties to products from medicine, to cleaning agents or to fuel. With ERC funding, Prof. Jana Roithova has developed a powerful instrument for chemical analysis that could, in the long run, bring completely new ideas or design for chemical production processes.

Prof. Roithova is interested in chemical reactions and in particular in what happens when a molecule transforms into a new one: what are the compounds created during the chemical reaction, how do they react and finally form the end product. With her team at the Charles University in Prague, she has developed a new instrument that can analyse the intermediary products of reactions and better understand their interaction with the 'catalyst' agents – such as molecules containing gold or copper - that are added to the mix to accelerate the reaction chain.

The researchers took a commercial mass spectrometry instrument as basis and added a cryogenic trap with a first of its kind design. Mass spectrometry is the most widely used method to analyse molecules in the environment (e.g. air pollution), in medicine or structural biology. Forcing the analysis at low temperatures with the 'cryo-trap' (molecules are 'frozen' at temperature close to the absolute zero point), the team have expanded the range of analyses that can be performed with mass spectrometry.

The main advantage lies in the technique ability to study reactive intermediates that have a short lifetime and can only be found in low concentration. The very-low temperature created by the trap can extend their lifetime and the instrument can 'catch' them, isolate them in vacuum and analyse their characteristics and properties.

In the course of the project, the researchers put the instrument to the test, helping elucidate several reaction mechanisms in the process. They focused on 'new' chemical reactions, not yet used by industry. *"One dream is to understand how to convert methane gas into methanol in its transportable, liquid form. This could open new avenues for an entire industry, including for energy storage or renewable fuels,"* says Prof. Roithova.

"The ERC grant has helped me start this research line and build my group," says Prof. Roithova, who is now a Professor and Head of the Department of Organic Chemistry at the Charles University. *"Designing and testing the instrument has also led to collaboration with several research groups across Europe working with intermediates that can only be characterised with mass spectrometry."*

Prof. Roithova was awarded several prizes for her research. In 2014, she was the first Czech researcher to receive the Ignaz L. Lieben Award, also known as the Austrian Nobel Prize. She has now moved on to new challenges of mass spectrometry with a second ERC grant funded under Horizon 2020.

Researcher: Jana Roithova, Charles University Prague (Czech Republic)

ERC Projects: Ion Spectroscopy of Reaction Intermediates (ISORI) + Mass Spectrometry of Isomeric Ions (IsoMS)

ERC funding: Starting Grant 2010, EUR 1.2 million (2011-2015) + Consolidator Grant 2015, EUR 1.6 million (2016-2021)



Instrument ISORI (Ion Spectroscopy Of Reaction Intermediates)



Frontiers of archeology: Discovery in Cambodia

Dr Damian Evans from the École française d'Extrême-Orient and his team used a laser radar mounted on a helicopter to scan the jungle in Cambodia in 2015. What resulted was one of the most important archeological discoveries in recent years.

Dr Evans received an ERC Starting Grant for his Cambodian Archaeological Lidar Initiative, or CALI, in 2014, and thanks to this funding he moved his research from Australia to France. His idea was to use airborne laser scanning to uncover, map and compare archaeological landscapes around all the major temple complexes of Cambodia. In 2015 the team carried out the most extensive airborne study ever undertaken by archaeologists. They scanned an area comparable in size to Greater London (1 901 km²) and discovered an extraordinary archive of human activity inscribed on the ground beneath the vegetation, spanning from recent times, through the great empire centered on Angkor from the 9th to 15th centuries AD, and all the way back to prehistory.

When he began the project he suspected that there would be some major findings, but did not know exactly where those would be. But there was a real risk of finding nothing. *"To me, one of the most appealing things about the ERC, is that it explicitly recognizes the potential for negative results and allows researchers the latitude and the funding to pursue 'blue-sky' research,"* said Dr Evans. Happily, they were able to uncover quite striking results which have completely changed our picture of what early cities looked like in various parts of Cambodia. His ERC project also provided hints about the present urbanism and sustainability of big cities. As Angkor is comparable in some ways to contemporary megacities, it can be considered a kind of laboratory for understanding how, in the past, such cities have succeeded – and ultimately failed. The research showed the potential of new technologies in certain areas of archaeology, for example in the study of archaeological landscapes. Geoinformatics and 'big data' have created a whole range of opportunities for interdisciplinary work by combining different fields to find and research patterns within data.

What are the plans for the future? The lidar data collection phase of the project is finished, and the team is verifying findings on the ground before more analysis and publications. Beyond that, Dr Evans is keeping a keen eye on developments in technologies like UAVs, lightweight lidar instruments, and satellite-based lidar technologies. *"There is enormous untapped potential for these technologies in tropical forest environments, not just for archaeology but also for other disciplines, all across Southeast Asia and beyond"* he says.

Researcher: Damian Evans, French School of Asian Studies - EFEO (France)

ERC Project: Cambodian Archaeological Lidar Initiative (CALI)

ERC funding: Starting Grant 2014, EUR 1.5 million (2015-2020)



© Damian Evans

The Angkor-period temple of Banteay Top, within the Banteay Chhmar acquisition block. Lidar revealed details of a large earthen enclosure and additional temple sites and occupation areas in the vicinity of this large stone temple.



Could personalised neuroprosthetics make paralysed patients walk again?

Prof. Grégoire Courtine believes paralysed patients will be able to walk again. This belief has represented the focus of years of work aimed at regenerating the functions of the spinal cord after injury. Thanks to his ERC funding in both 2010 and 2015, Prof. Courtine and his team have been able to develop so-called “personalised neuroprosthetics” that have led immobile rats, and more recently monkeys, to overcome their paralysis.

Fifty thousand people worldwide lose the ability to move their legs due to traumas to the spinal cord, and Prof. Courtine is aware of what the results of his work could mean for patients unable to walk. His research is based on the idea that the spinal cord already contains, within itself, the neuronal network to allow walking, despite being, in fact, controlled by the brain. When its ties to the brain are severed, for example after an accident, the cord alone should be able to generate movement.

This idea is fairly revolutionary for neurosciences, and an example of the “high-risk, high-gain” frontier research the ERC aims to nurture. Prof. Courtine was inspired to approach the issue from this different angle by working with the patients of the [Christopher and Dana Reeve Foundation](#) and listening to the Superman actor.

In order to stimulate the spinal cord to move, Prof. Courtine and his team developed implants to deliver drugs and electrical stimuli to the injured areas. This allowed for movement that was, however, involuntary. Therefore, work continued on a “robot” that could support the animal safely, allowing it to practice moving intentionally. Thanks to the apparatus, after relatively short periods of time, the animals that tested this method could walk again, even without the implants.

The right physiotherapy, achieved thanks to the supportive machinery and the correct stimulation had, in the animals that responded well to treatment, allowed a new connection to establish between the brain and the spinal cord. Prof. Courtine states: *“This came as a surprise, even to our team. It showed an example of the incredible plasticity of the nervous system, and encouraged us to keep on”*. See [TED Talk](#).

Although the extent of the consequences of this work for the treatment of human paralysis is still unknown - bipedal walking habits representing, for example, a new layer of complexity – there is no doubt that this discovery offers new hope for the future. In 2016, in fact, the team showed the revalidation could also work for primates¹.

The ERC funding allows the Professor to employ a multi-disciplinary team of young researchers, from physiotherapists to neuroscientists, neurosurgeons and engineers. It is this forward-thinking, highly-qualified team that is at the basis of this great medical breakthrough.

¹ <http://www.nature.com/news/brain-implants-allow-paralysed-monkeys-to-walk-1.20967>.

• • • • •
• • • • •
Researcher: Grégoire Courtine, Swiss Federal Institute of Technology Lausanne (Switzerland)

ERC project: Multi-pronged Strategies to Regain Voluntary Motor Functions after Spinal Cord Injury (WALK AGAIN) + Mechanisms of recovery after severe spinal cord injury (HOW2WALKAGAIN)

ERC funding: Starting Grant 2010, EUR 1.4 million (2010-2015) + Consolidator Grant 2015, EUR 2 million (2016-2021)



© EPFL, Alain Herzog

Some elements of the brain-spine interface: A microarray of electrodes on a silicon model of a primate brain, a pulse generator and a spinal implant composed of 16 electrodes

Translation of science into business innovation



© Max Planck Society,
credit David Ausserhofer

Innovative vaccines and diagnostics open new opportunities for European companies

Glycans are complex sugars surrounding most of our body's cells. They play an essential role in cell communication and within the immune system. Prof. Peter Seeberger's ERC-funded research has focused on these important targets for drugs to develop new vaccines and therapies against infectious diseases. His results have led to several spin-offs and the creation of high-skill jobs in Germany and Switzerland.

Heparin is the most commonly used anticoagulant today to treat patients undergoing surgery or suffering from conditions such as deep-vein thrombosis and acute coronary syndrome. Naturally produced by the body, heparin has an antibacterial role, but when it is used as an injectable drug, it can have dangerous side effects. After major surgery or dialysis, a possible side effect is heparin-induced thrombocytopenia Type II (HIT-II) that can result in clots, multi-organ failure and, in 20 % of cases, in death. Although some diagnostic tools are available, faster, more reliable and cheaper methods to diagnose complications linked to the administration of heparin are necessary to improve patient well-being, reduce mortality and decrease health costs.

Prof. Seeberger, a renowned chemist and biochemist, has been studying glycosaminoglycans (GAGs) throughout his career. These are a large class of glycans to which heparin belongs. With the AUTOHEPARIN project, funded by an Advanced Grant, Prof. Seeberger succeeded to design a tool to chemically synthesize GAGs within days, a drastic improvement from previous methods which required months. In addition, these GAG arrays were found to be excellent tools to screen patients' blood for antibodies. Prof. Seeberger also discovered that antibodies directed at GAGs can detect HIT-II in patients receiving heparin. This method to identify HIT-II complications quickly and more accurately started to attract the interest of clinicians.

In order to translate these findings into business opportunities, Prof. Seeberger was awarded two ERC Proof of Concept grants. The first project looked at the production of an automated carbohydrate synthesizer and defined the market potential of synthetic carbohydrates for medical applications such as diagnostics and vaccines. With the second one, he explored the possibilities of commercializing a new test to diagnose adverse reactions to heparin treatment. With 12 million patients treated with heparin and 100 000 cases of HIT-II per year in the EU, this novel diagnostic has a high market potential. Thanks to this additional funding, two spin-off companies were successfully established: in 2013, GlycoUniverse¹, that is currently fully operational and, in 2016, Berliner Diagnostik Werke, for which a first round of discussions with potential customers and investors has been concluded.

In 2015, the scientific findings of Prof. Seeberger led to the set-up of Vaxxilon². The company, that now employs 12 people, was declared "Science Start-Up of the Year" at the Falling Walls Venture conference in November 2016 for its development of synthetic glycan-based vaccines. In the future, these new synthetic molecules could make vaccinations against infectious diseases such as multi-resistant hospital-acquired infections cheaper and easier to administrate and thereby also improve access to vaccines in poorer countries.

Prof. Seeberger says: *"It is an immense challenge to translate basic science into commercial applications. For me as a scientist, this dream is coming true thanks to trust and the funding by my employer, the Max-Planck Society and by the ERC"*. Both in 2015 and 2016, the researcher placed among the top on the list of 100 most influential people in the field of drug development published by the British journal *Medicine Maker*³.

1 <http://www.glycouniverse.de>

2 <http://vaxxilon.com>

3 <https://themedicinemaker.com/power-list/2016>

• • • • •
• • • • •
Researcher: Peter Seeberger, Max Planck Institute of Colloids and Interfaces (Germany)

ERC Projects: Automated Synthesis of Heparin and Chondroitin Libraries for the Preparation of Diverse Carbohydrate Arrays (AUTOHEPARIN) +
Automated Glycosaminoglycan Synthesis to Access Defined Oligosaccharides for Diagnostic and Therapeutic Applications (GAGAUTOSYN) +
Rapid and Inexpensive Diagnosis of Heparin Induced Thrombocytopenia Using Glycan Arrays Containing Synthetic Glycosaminoglycans (HITCHIPDIAG)

ERC funding: Advanced Grant 2008, EUR 2.5 million (2009-2014) +
Proof of Concept 2011, EUR 148 000 (2012-2013) +
Proof of Concept 2014, EUR 147 000 (2015-2016)



© Max Planck Society, credit David Ausserhofer

Automated carbohydrate synthesizer

Translation of science into social innovation

© Christian-Lionel Dupont



Inside the mind of a voter

What do elections mean for citizens? What happens in the voters' mind in the polling booth? How do elections' practical arrangements affect the voter's final choice? The results of Prof. Michael Bruter's research could help governments and Election Management Bodies to optimise democratic processes and improve voters' satisfaction and turnout.

In every election, between 20 and 30% of voters change or make their minds within a week of the vote, half of them on Election Day. This is one of the [findings of the INMIVO](#) project that also showed how over a quarter of citizens have already cried because of an election, how postal and internet voting can leave young people more dissatisfied than voting in a polling station and ultimately increase abstention. The project also showed how voters divide in two categories that tend to see their role as voters radically differently: referees and supporters, with crucial consequences on political attitudes. From 2010 to 2015, Prof. Bruter and his team explored the psychology of voters in 25 countries around the world (including 13 in the EU), focusing on what drives their choices in this intimate and exceptional minute when they cast their ballot.

To examine voters' psychology, their emotions and the memories associated with the vote, the researchers have combined methods such as panel study surveys and interviews with unique approaches, including election diaries, intergenerational family focus groups, and visual experiments whereby Prof. Bruter and his team observed the shadow of voters and analysed their facial reactions and body language in the polling booth.

The ambition and innovative methods of the project have earned Prof. Bruter the award for 'Best International Research 2013' from the Market Research Society (MRS), and broad coverage in academic publications and media alike.

The team also conducted fieldwork on vulnerable voters and on first time voters among others. Their study shows that voters' first two elections determine turnout and democratic engagement for their entire life. Increasing participation and satisfaction in their first election is therefore crucial, and Prof. Bruter modelled the impact of lowering the voting age to 16 in that respect. With a [Proof of Concept](#) project, Prof. Bruter has been testing techniques to optimise the experience of first time voters before, during and after the vote, and maximise their satisfaction and turnout.

Created as part of the ERC project, the [ECREP group](#) at London School of Economics led by Prof. Bruter with Dr Sarah Harrison, has coined the term 'electoral ergonomics' which studies how every aspect of electoral arrangements affect voters and their behaviour. Since 2012, the team has advised European and national organisations on topics ranging from the involvement of young voters; how to improve fairness, inclusiveness and transparency in elections; and on improving citizens' trust in and satisfaction with electoral democracy.

More results of the INMIVO project are described in the [project report](#).

Follow news and developments of the research team at www.ecrep.org or on social media @ECREP_lse

• • • • •
• • • • •
Researcher: Michael Bruter, London School of Economics and Political Science (United Kingdom)

ERC Project: Inside the mind of a voter - Memory, Identity, and Electoral Psychology (INMIVO) + That Special First Time - Boosting Turnout and Satisfaction amongst First Time Voters (FIRSTTIME)

ERC funding: Starting Grant 2009, EUR 1.2 million (2010-2015) + Proof of Concept 2015, EUR 150 000 (2016-2017)



© istockphotos.com

Impact on researchers' careers



© Accenture

Advancing science and serving as a role model

There is no easy cure for obesity nowadays, as scientists have an incomplete understanding of what controls body weight. With ERC funding, Dr Lydia Lynch has returned to Europe from the US to work on an entirely new field in the treatment of obesity.

In the last 15 years, it has emerged that chronic inflammation, particularly in adipose tissue, interferes with insulin signaling, causing diabetes and obesity. Harnessing the immune system to regulate adipose inflammation and body weight, therefore, represents a new research pathway. The immune system in adipose tissue is largely under-appreciated; yet fat tissue covers the whole body and contains lymphocytes with unique functions compared to their counterparts elsewhere in the body.

Dr Lydia Lynch is one of the researchers who have recently identified the critical role of invariant natural killer T cells (iNKT) –the lipid-sensing arm of the immune system - that are natural anti-inflammatory agents found in fat tissue (iNKT are usually pro-inflammatory - just in adipose tissue they are not - as Dr Lynch discovered). The link between obesity and compromised immunity in humans was the focus of Dr Lynch's post-doctoral work in Ireland. In 2009, the young biologist received a prestigious L'Oreal-UNESCO Women in Science award, followed by a Marie Curie international fellowship, to carry out investigations at Harvard Medical School in Boston, where she established major collaborations and ultimately set up her own lab.

In 2015 Dr Lynch applied to the ERC Starting Grant competition with the goal of pursuing her research back in Europe and she succeeded. Thanks to EUR 1.8 million in funding, she now leads a multidisciplinary research team of five and she is now establishing a state-of-the-art in vivo immunometabolic facility in Ireland, the first of its kind in the country. For her, this project represents *"a unique synergy between my scientific goals and the strategic plan of Trinity College Dublin which aims to become a European leader in immunometabolism"*.

Dr Lynch, who in the meantime has been appointed Associate Professor, wants to find out why the iNKT cells die when humans become obese, and how to prevent them from dying or to activate them again. According to her, the ability to boost adipose iNKT cells could be the key to reversing adipose inflammation, providing a new therapeutic path for treating obesity and type 2 diabetes. Her research has major impacts in the fields of immunology, metabolism and endocrinology.

In November 2016, Dr Lynch has been listed as one of the 20 women making essential contributions to science around the world by Silicon Republic¹, the Irish leading news portal for science and technology.

She was also part of the 2016 'Women on Walls' campaign in Ireland, by the Royal Irish Academy in partnership with Accenture, that seeks to make women leaders visible through a series of commissioned portraits to inspire future generations. She was also featured as one of the biggest Irish talents under 40² by the Independent, Ireland's largest-selling daily newspaper.

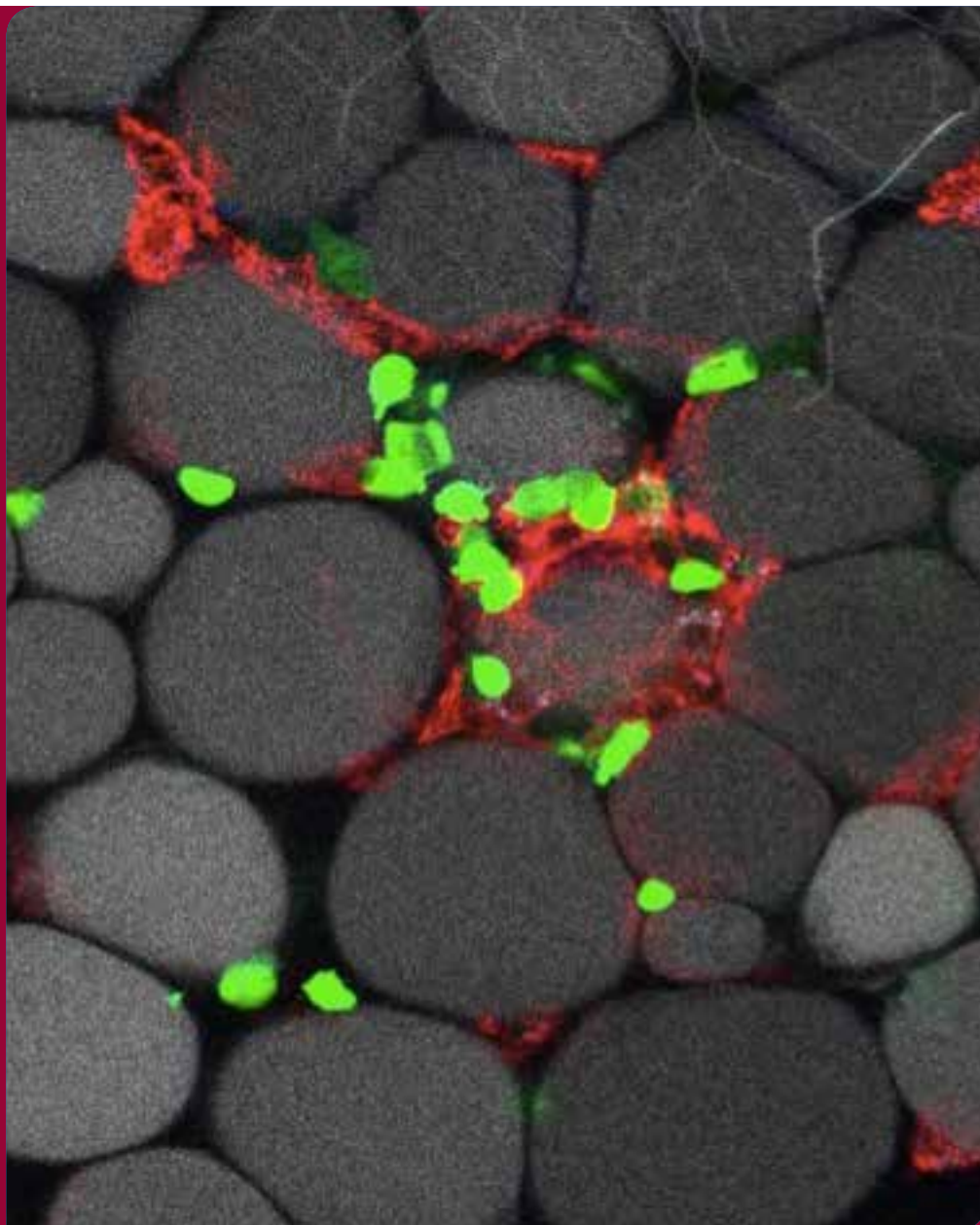
1 <https://www.siliconrepublic.com/innovation/women-scientists-global-research-science>

2 <http://www.independent.ie/life/irelands-40-under-40-you-should-know-35066963.html>

Researcher: Lydia Lynch, Trinity College Dublin (Ireland)

ERC Project: Targeting iNKT cell and adipocyte crosstalk for control of metabolism and body weight (FAT NKT)

ERC funding: Starting Grant 2015, EUR 1.8 million (2016-2021)



© Lydia Lynch

iNKT cells (green) and macrophages (red) talking in adipose tissue



Slovak scientist of the year

In only three years' time, Dr Ján Tkáč went from being the first ERC grantee in Slovakia to obtaining the "2015 Scientist of the Year" award. His research in the field of glyconomics could emerge as a turning point for the diagnosis of cell-related diseases.

Dr Ján Tkáč got his Ph.D. degree in biotechnology and D.Sc. degree in analytical chemistry in Slovakia. He did postdoctoral stays in the UK and Sweden, where he benefited from an individual Marie-Curie fellowship. Nowadays based at the Institute of Chemistry in the Slovak Academy of Sciences, he was the first researcher to obtain, in 2013, an ERC grant in Slovakia, where he had returned after his postdoc experiences. Only three years later, in May 2016, he received the prestigious Slovak "2015 Scientist of the Year" award for his ERC research on the use of nano-biotechnologies for potential cancer diagnostics.

Glycans are complex sugar molecules that carry the information human cells need to stay healthy and fight infections at the first sign of attack. Unluckily, infectious pathogens and cancerous cells have developed subterfuges to bypass this first line of defence, as they crack the glycan's molecular code or steal its identity, going unrecognised by cells until the infection is well advanced.

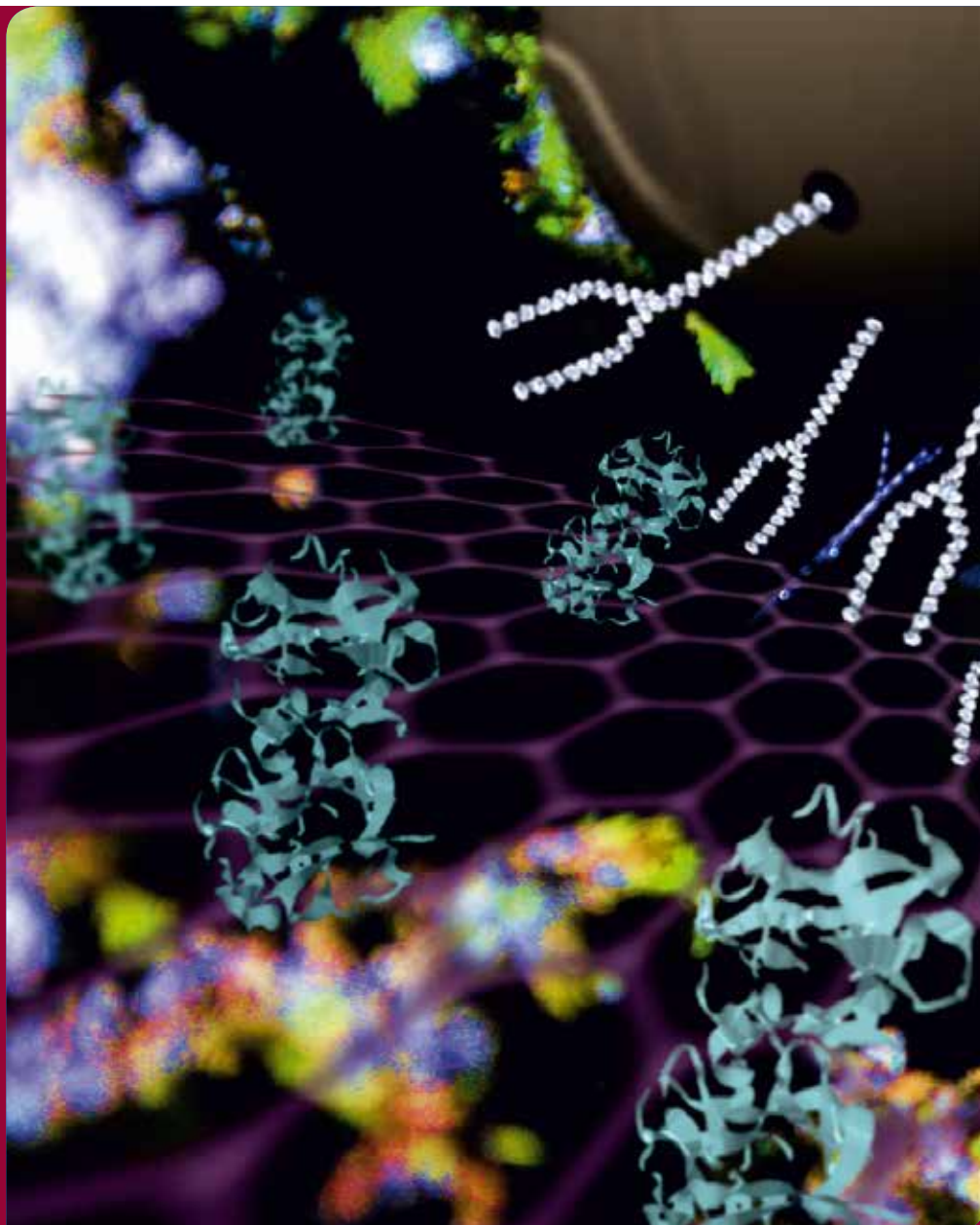
To tackle this phenomenon, Dr Tkáč's has engaged in a cellular 'cold war'. With his team, he develops novel early-detection technologies based on the development of nano-biochip sensors that, in case of disease development and progression, can detect changes in glycans at an early stage of the process and with greater sensitivity. The novelty relies also in the combination of two distinct scientific fields: glycomics and nanotechnology.

With his ERC grant, Dr Tkáč set a talented team in Slovakia and developed new infrastructure in his country, from which he cooperates with several European research groups. So far, the research results are promising, with potential applications for the early detection of many diseases, including prostate cancer, rheumatoid arthritis and systemic sclerosis.

Researcher: Ján Tkáč, Institute of Chemistry - Slovak Academy of Sciences (Slovakia)

ERC Project: Electrochemical LECTin and glycan biochips integrated with NANOstructures (ELENA)

ERC funding: Starting Grant 2012, EUR 1.1 million (2013-2017)



Artistic representation - detection of glycoprotein by the graphene modified biosensor





Advancing frontier research

ERC calls 2016

ERC Starting Grant call 2016

The 2016 ERC Starting Grant call was published in July 2015 with an indicative budget of EUR 485 million. In total, 2 935 proposals were received, distributed by domain as follows: 1 288 proposals in Physical Sciences and Engineering (44 %), 869 in Life Sciences (30 %) and 778 in Social Sciences and Humanities (26 %). A total of 374 proposals were selected for funding (data as of December 2016). In the end around EUR 560 million were awarded with an overall average grant size of around EUR 1.5 million.

The share of female applicants in Starting Grant 2016 was 36 % of all applicants. The share of female Principal Investigators (PI) was 31 % of all selected PIs in the call. Their success rate was 11 % compared to 14 % for male PIs.

ERC Consolidator Grant call 2016

The 2016 ERC Consolidator Grant call was published in October 2015 with an indicative budget of EUR 605 million. In total, 2 305 proposals were received, distributed by domain as follows: 1 078 proposals in Physical Sciences and Engineering (47 %), 710 in Life Sciences (31 %) and 517 in Social Sciences and Humanities (22 %). A total of 314 proposals were selected for funding (data as of December 2016). About EUR 619 million were awarded with an overall average grant size of around EUR 2 million.

The share of female applicants in the Consolidator Grant 2016 call was 28 % of all applicants. The share of female PIs was 28 % of all selected PIs in the call. Their success rate was 14 % as in the case of male PIs.

ERC Advanced Grant calls 2015 and 2016

The 2015 ERC Advanced Grant call was published in February 2015 with an indicative budget of EUR 630 million. A total of 1 953 proposals were received, distributed by domain as follows: 887 proposals in Physical Sciences and Engineering (45 %), 643 in Life Sciences (33 %) and 423 in Social Sciences and Humanities (22 %). The evaluation process was finalised in June 2016 and 277 proposals were selected for funding. Around EUR 648 million were awarded with an overall average grant size of around EUR 2.3 million.

The share of female applicants to Advanced Grant 2015 was 17 % of all applicants. The share of female PIs was 19 % of all selected PIs in the call. Their success rate was 16 % compared to 14 % for male PIs.

The 2016 ERC Advanced Grant call was published in May 2016 with an indicative budget of EUR 540 million. In total, 2 404 proposals were received and distributed by domain as follows: 1 096 proposals in Physical Sciences and Engineering (46 %), 746 in Life Sciences (31 %) and 562 in Social Sciences and Humanities (23 %).

The share of female applicants in the Advanced Grant 2016 call was 17 % of all applicants. At the moment of printing this report, the evaluation process was still in progress.

ERC Proof of Concept call 2016

The 2016 ERC Proof of Concept call was published in October 2015, with a first deadline on 16 February, a second deadline on 26 May, a third one on 4 October 2016 and a budget of EUR 20 million. A total of 142 proposals were received for the first deadline, 134 for the second and 161 for the third.

The evaluation process resulted in a total of 44 proposals being retained for funding for the first deadline, 45 for the second and 44 for the third, for a total of 133 for the whole 2016 call (data as of January 2017).

The share of female applicants in the Proof of Concept 2016 call is 20 % of all applicants. The share of female PIs is 10 % of all selected PIs in the call. Their success rate was 17 % compared to 37 % for male PIs.

Table 1: ERC calls for proposals in Horizon 2020

ERC Call	Applications received	Of which		
		Evaluated *	Funded	Success rates (%) **
Starting Grant 2014	3 273	3 204	375	12 %
Starting Grant 2015	2 920	2 862	349	12 %
Starting Grant 2016	2 935	2 881	374	13 %
Starting Grant total	9 128	8 947	1 098	12 %
Consolidator Grant 2014	2 528	2 485	371	15 %
Consolidator Grant 2015	2 051	2 023	303	15 %
Consolidator Grant 2016	2 305	2 274	314	14 %
Consolidator Grant total	6 884	6 782	988	15 %
Advanced Grant 2014	2 287	2 250	192	9 %
Advanced Grant 2015	1 953	1 927	277	14 %
Advanced Grant total	4 240	4 177	469	11 %
StG, CoG and AdG total	20 252	19 906	2 555	13 %
Proof-of-Concept 2014	442	426	121	28 %
Proof-of-Concept 2015	339	323	160	50 %
Proof-of-Concept 2016	437	405	133	33 %
Proof-of-Concept total	1 218	1 154	414	36 %

* ineligible and withdrawn proposals not taken into account ** basis: evaluated proposals

Data as of January 2017

Host Institutions and Countries

ERC competitions are open to any researcher anywhere in the world who wants to conduct research in an EU Member State or a framework programme Associated Country (AC). After the completion of ERC calls from 2007-2016 (except Advanced Grant 2016), over 700 research institutions from 33 countries, both EU Member States and Associated Countries, host at least one ERC grantee. 40 % of the host research organisations have at least five ERC grantees.

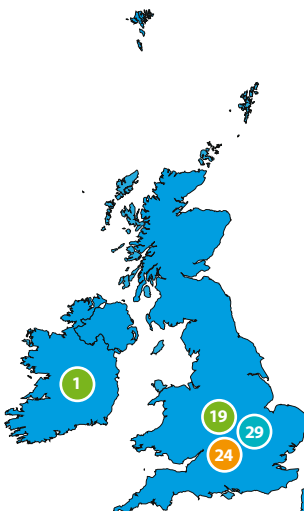
The majority of the ERC grantees, exactly 87 %, are hosted by institutions located in the EU and 13 % have a Host Institution (HI) in an Associated Country.

The ERC list of grantees also displays 69 nationalities, as declared by the PIs at the time of granting, which consist of all EU nationalities, 10 Associated Countries and 31 other nationalities. Overall, 8 % of ERC grantees are nationals of countries outside the EU/AC. United States nationals are by far the most common with 218 grantees, representing 41 % of all non-EU/AC grantees.

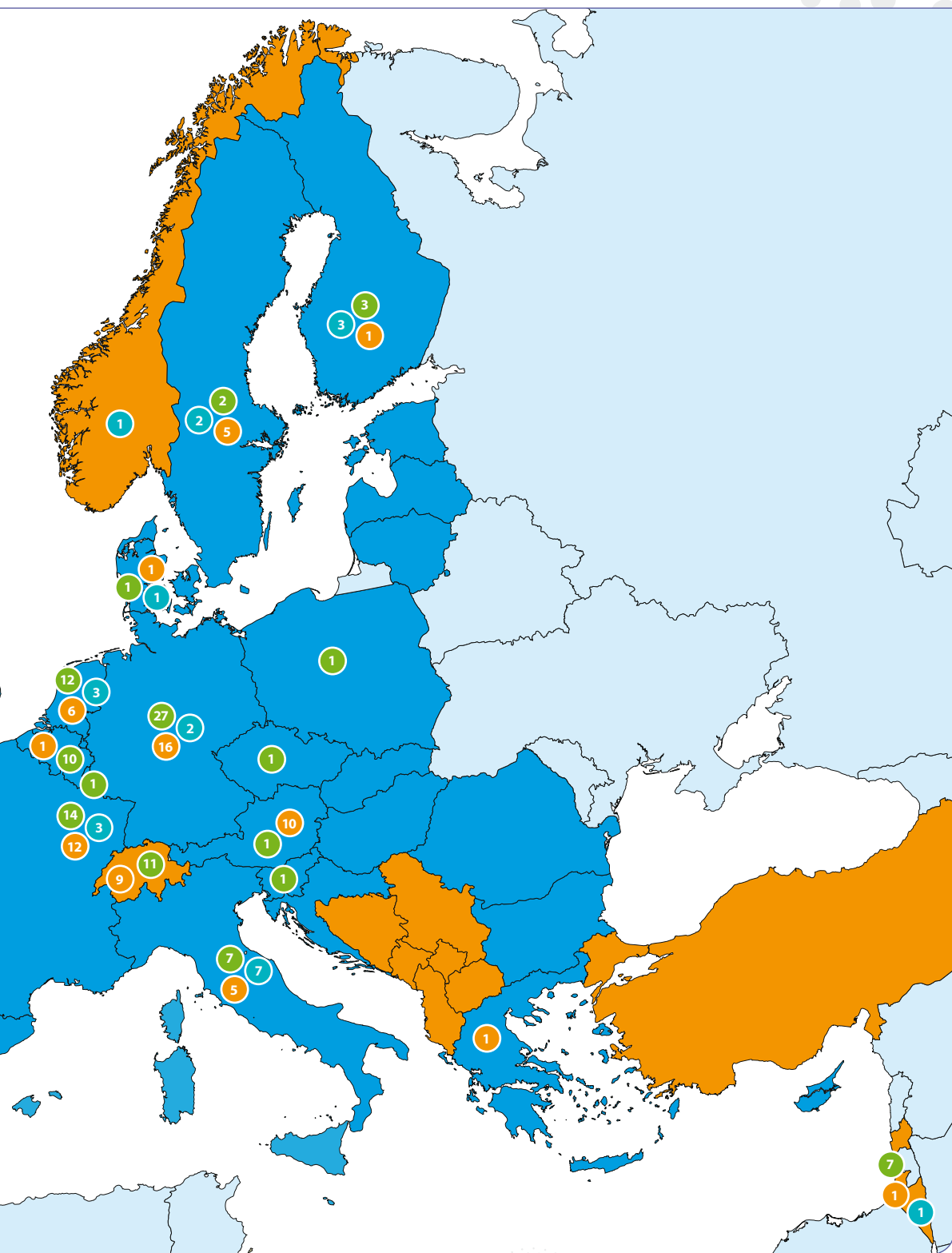
90 % of the ERC grantees were already resident in the country of the Host Institution at the time of application. Only 10 % of the grantees applied with a Host Institution based in a country other than the one where they resided; about a third of them were resident outside the EU/AC and moved to Europe with the ERC grant.

Map 1: ERC Advanced Grant: 2015 Call
Geographical distribution of grant holders

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



Data as of December 2016.
Host organisations that signed/were invited to sign the first grant agreement.

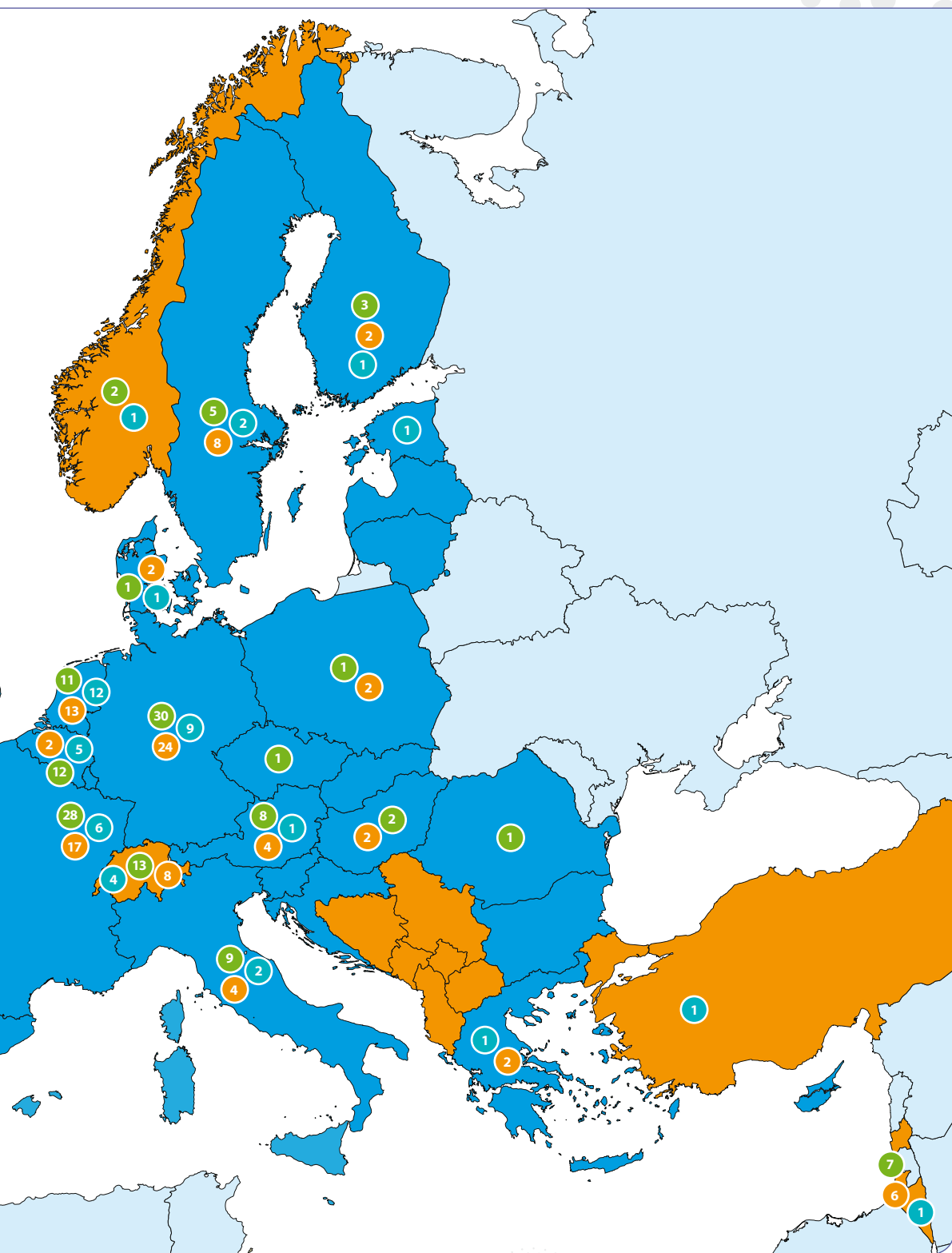


Map 2: ERC Starting Grant: 2016 Call
Geographical distribution of grant holders

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

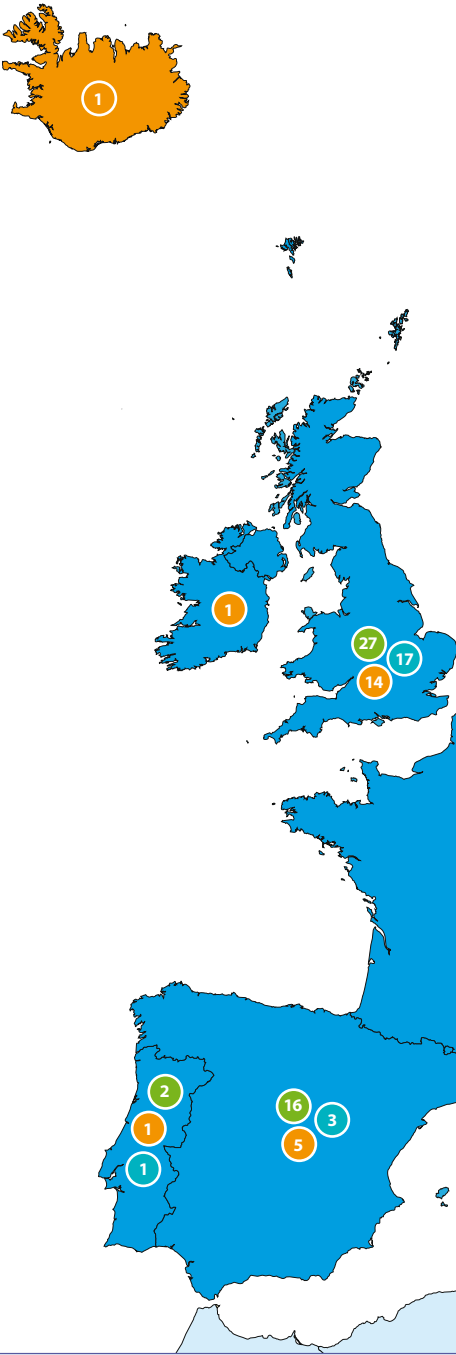


Data as of December 2016.
Host organisations that signed/were invited to sign the first grant agreement.



Map 3: ERC Consolidator: 2016 Call
Geographical distribution of grant holders

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



Data as of December 2016.
Host organisations that signed/were invited to sign the first grant agreement.





4.1 The ERC Scientific Council

The Scientific Council has the responsibility to establish the ERC's overall scientific strategy, the Work Programme and, from a scientific perspective, positions on the implementation and management of calls for proposals, evaluation criteria, peer review processes and proposal evaluation. It is made up of members of the scientific community of the highest level, knowledgeable of the European scene, acting in their personal capacity and independently of political, national or other interests.

In 2007, 22 members were appointed by the European Commission as founding members of the Scientific Council, selected on the basis of the criteria set out in Commission Decision 2007/134/EC of 2 February 2007 establishing the ERC. This includes the requirement that the Scientific Council's composition would allow it to be independent, combining wisdom and experience with vision and imagination and reflecting the broad disciplinary scope of research. Individual members are chosen based on their undisputed reputation as leaders and for their independence and commitment to research. Their term of office shall be limited to four years, renewable once, on the basis of a rotating system which shall ensure the continuity of the work of the Scientific Council.

Scientific Council members, appointed by the European Commission, are selected following a transparent procedure by an independent committee of seven highly respected personalities in European research. The identification procedure is agreed with the Scientific Council and includes consultation of the scientific community at large.

In 2016 the Scientific Council welcomed four new members: Christopher Clark, Kurt Mehlhorn, Barbara Romanowicz and Nektarios Tavernarakis. The names of the members of the Scientific Council who served in 2016 can be found on pages 76 and 77 of this report.

ERC President



Prof. Jean-Pierre
Bourguignon

Professor Jean-Pierre Bourguignon, an internationally respected mathematician — who was Director of the Institut des Hautes Études Scientifiques near Paris from 1994 to 2013 and a CNRS fellow all his professional life — took office as President of the ERC on 1 January 2014 for a four year term, renewable once.

He was appointed by the European Commission following a transparent recruitment process based on the recommendations of an independent, dedicated search committee and with the approval of the Scientific Council.

The role of the President is to chair the Scientific Council and ensure its leadership, to work closely with the ERCEA and to act as an ambassador for the ERC in the world of science. In order to help ensure even closer scientific governance of the ERC, under the Horizon 2020 legislation, the ERC President is employed as Special Adviser to the European Commission, and resides in Brussels for the duration of the appointment.

Meetings

The Scientific Council held regular plenary meetings in 2016 both in Brussels and across Europe, usually at the invitation of national authorities. Meeting in different countries, either EU Member States or Associated Countries, is a way of making the ERC more visible. The meetings are also considered important events both by the national authorities as well as the local scientific and research community. Five Scientific Council plenary sessions were organised during the period between 1 January and 31 December 2016: in February, June and December in Brussels (Belgium), in April in Copenhagen (Denmark) and in October in Dublin (Ireland).

Standing Committees and Working Groups — Following the recommendations of the panel on the review of the ERC's structures and mechanisms in 2009, the Scientific Council established two standing committees: the first to provide guidance on conflicts of interest, scientific misconduct and ethical issues (CoIME), and the second to deal with the selection of evaluation panelists. The Executive Agency supported the operational activities of the two committees, which met three and four times respectively in 2016.

The members of the Scientific Council also meet in Working Groups (WGs) addressing specific issues. In 2016, various meetings of the ERC WGs on innovation and relations with industry, open access, strengthening international participation, gender balance, key performance indicators and widening European participation were organised by the Executive Agency. A series of working documents containing analyses and key messages on the specific issues dealt with by the WGs and by the standing committees were prepared by the Executive Agency, in collaboration with members of the groups.

The WGs carry out analyses and contribute to the ERC's scientific strategy through proposals to be adopted by the Scientific Council in plenary in the areas covered by their mandates: to examine the ERC's relationship with the industrial/business sector and the impact of ERC-funded research on innovation; to develop an ERC position on open access; to ensure that the ERC is at the forefront of best practices with regard to gender balance in research; to explore suitable mechanisms to increase the participation of researchers in ERC calls from countries outside the EU; to evaluate the ERC's accomplishment of its mission, using qualitative and quantitative methods to support the short-, medium- and long-term policies of the Scientific Council; and to encourage central and eastern European countries to better nurture their scientific talent and invest more in research.

Two groups started their activities in 2015, a Taskforce on interdisciplinary research and a Working Group on 'Science behind the projects'.

Taskforce on interdisciplinary research and re-introduction of Synergy Grants

In its last plenary meeting of 2015, following discussions on the re-introduction of the Synergy Grant calls among the ERC funding instruments and on the development of a separate funding scheme dedicated to supporting exploratory interdisciplinary research, the Scientific Council mandated a combined Taskforce on interdisciplinary research and Synergy Grant to consider whether, in 2016, the two proposals could be combined.

Various options were explored and discussed. In the plenary meeting of April 2016 the Scientific Council decided that the two grants should not be combined into one single scheme, but developed and proposed for considerations as standalone funding schemes.

In October 2016, the Scientific Council in plenary voted to re-introduce the Synergy Grant starting from 2018 with an initial budget of EUR 250 million, which could be increased to EUR 400 million in 2019 and 2020.

The discussions on the need, scope and modalities of a dedicated funding scheme to support exploratory interdisciplinary research will continue separately.

‘Science behind the projects’

‘Science behind the projects’ is an ex-ante content analysis of the ERC-funded projects, using expert judgment (i.e. the ERC scientific officers) that will enable ERC to systematically report on the research areas/topics/fields that are funded, including on funding trends. During 2016 the Working Group on Science behind the projects has developed an in-house classification system along three dimensions: disciplines, topics and methods. The disciplines are aligned with accepted ontologies, the topics refer to research areas at the forefront of scientific knowledge and the methods include novel methodological approaches. At the moment, the Executive Agency is running a pilot exercise to test the classification system on a few hundred projects from the 2014 calls, in order to identify problems and/or improvements which are needed. The plan is that once the issues identified by the pilot exercise are fixed, the ‘Science behind the projects’ exercise for all ERC-funded projects in Horizon 2020 will be launched in May-June 2017.

Support to the Scientific Council

Due to the specific governance model, the Scientific Council’s plenary meetings are prepared with the organisational and administrative support of the unit ‘Support to the Scientific Council’ in the Executive Agency. The unit also provides advice and analysis to facilitate the work of the Scientific Council to fulfil its tasks.

In response to relevant requests by the Scientific Council, the unit continuously advises the members in their activities by providing analysis and intellectual input through the drafting of various documents that reflect the Scientific Council’s main orientations. These include the ERC annual Work Programme and this Annual Report. In 2016, briefings, presentations and data analysis on the ERC’s performance were prepared by the unit for the ERC President (89) and several members of the Scientific Council (52) for their participation in various events worldwide. A series of other working documents and in-depth analyses were prepared during the year by the support unit, providing advice and assistance to the work of the Scientific Council and its standing committees and WGs.

The ERC Board

To further assure its liaison with the European Commission and the Executive Agency, the President and Vice-Presidents of the Scientific Council together with the Director of the Agency meet regularly as the ERC Board. The senior management of the Agency also attends these meetings. The board met seven times in 2016, in particular to prepare or provide follow-up to the meetings of the Scientific Council.

Case reporting on scientific misconduct and conflict of interest

The ERC strategy on scientific misconduct provides for record keeping and reporting of cases in this Annual Report. In 2016 the ColME gave its advice on 15 cases of alleged scientific misconduct, including 11 cases of peer reviewers' breaches of their Code of Conduct. The following is a report of five cases which were still pending at the end of 2015 and were closed in 2016 and of the 12 cases dealt with and closed in 2016. In three more 2016 cases the final decision was still pending at the end of the year.

Cases of scientific misconduct

Breaches of the ethics provisions on the gathering and keeping of data

The ERCEA received a joint complaint from six former postdocs of an ERC-funded project reporting breaches in the ethics provisions over the gathering and keeping of data for this project.

From the information received by the ERCEA following a request for clarifications, there seemed to be several instances pointing to unsecure storage of sensitive data. There seemed to be also issues related to anonymisation of data as well as handling informed consent from interviewees, all these points being in contradiction with the statement provided at granting stage by the PI.

Conformity with the ethics and personal data protection rules together with the commitments undertaken in this regard in the project could only be checked with an ethics audit conducted through the Directorate-General for Research and Innovation of the European Commission. The ethics audit conducted revealed data protection issues related to the project and ethics approval problems in the Host Institution. The findings were immediately recognised by the PI, who was asked to comply with the ethics requirements as per the ethics clearance which would be given to the project further to the audit.

Following information received, the ERCEA considered that the measures taken by the PI were appropriate. Few pending points will be followed up by the Agency according to the developments of the project. In consultation with the ColME, the case was closed as no scientific misconduct case.

Made-up papers

In the process of the evaluation of a proposal submitted to the ERC, a remote reviewer claimed that some results presented in two published papers co-authored by the applicant had been made-up. One of the papers was related to the on-going ERC grant of the applicant.

After receiving additional information from the PI and after consultation with the evaluation panel about the link between the proposal and the publications potentially related to some wrongdoing, the matter was considered as clarified and the unanimous decision of CoIME was that no action should be taken in this case.

Inflated role of PI

During the evaluation of a proposal, the evaluation panel became aware of the allegation of a panel member's review regarding the inflated role of the applicant in the list of papers reported in the application. The evaluation panel decided to disregard the allegations and finally retained the proposal for step 2 of the evaluation. After analysing the case, the decision of CoIME was that no serious breach of research integrity had taken place.

Manipulation in several publications (case started in 2015)

The ERCEA was informed about measures taken by a research institution against the PI of an ERC-funded project, reporting allegations of data manipulation in several publications. The PI was on leave from that organisation and was at the time employed by another one, the HI of the PI's ERC grant. The original organisation had set a two-year time period during which the PI could not ask to be reintegrated. For the same reasons, a well-known research organisation had revoked a prestigious award conferred to the PI, after the PI admitted data manipulation in some papers, seven of which were retracted. The current HI did not take any official sanctions against the PI but would closely be monitoring the PI's future work.

In this context, the ERCEA assessed if the papers for which the allegations were made were related to the PI on-going ERC grant or to a former grant of the PI, already completed.

It could be confirmed that four of the PI's papers related to the first project had been found sloppy and had required several errata and corrigenda. One paper had been retracted. However at that stage there was no evidence of scientific misconduct or of a deliberate wish to falsify results.

In view of this situation, the ERCEA and the CoIME did not consider this case to be a case of scientific misconduct in the context of the current and former ERC grants of the PI. In consultation with the CoIME, the case was closed. However, in case new elements would arise with the implementation of the running ERC grant, the ERCEA and the CoIME would re-assess the situation.

Papers questioned in PubPeer

The ERCEA was informed that the PI of an ERC-funded project had co-authored 20 papers that had been questioned in PubPeer. One of the papers had been retracted and another four had been corrected. None of these five papers seemed to be related to the ERC grant.

Five of the papers in the PubPeer list were identified by ERCEA as included in the final activity report submitted by the PI and acknowledging ERC funding. These papers did not seem to be directly related to the objectives of the ERC project.

Following consultation with the COIME, the PI was contacted to provide clarifications about the allegations and the link between the papers questioned and the objectives of the ERC project.

The PI confirmed that there was no link between the papers listed in PubPeer and the objectives of the ERC project. The PI also indicated that the Host Institution conducted an investigation of all these anonymous accusations and informed the PI in a preliminary letter that it was concluded that there was no scientific misconduct in any of the papers subject to those accusations.

In view of this situation, the ERCEA and the CoIME did not consider this case to be a case of scientific misconduct in the context of the current ERC grant. The case was closed as a no scientific misconduct case.

Breaches of the Code of Conduct of reviewers

In one case, the evaluation panel observed that in the review of a panel member it was declared that he/she had been a collaborator in a FP7 project coordinated by the PI. The panel excluded the review in the evaluation of the proposal due to conflict of interest.


In a second case, the evaluation panel observed that a panel member was explicitly mentioned in the proposal as expected project advisor. It was also noticed that the reviewer was the applicant's former post-doctoral supervisor. The panel excluded the review in the evaluation of the proposal due to conflict of interest.

Another seven cases similar to those described above were observed, involving remote referees.

As was done in the past for similar cases, the decision of CoIME and the ERCEA was to send letters to the reviewers alerting them on the breach of the code of conduct occurred.

In another case, a reviewer remotely evaluated a proposal that was competing with a proposal submitted to the same panel by the reviewer's partner. When asked, the remote reviewer confirmed having reviewed the application without reading carefully the Code of Conduct and therefore without realising the specific point on the potential conflict of interest related to the other application from the reviewer's partner. The members of CoIME unanimously approved the ERCEA's suggestion to send the reviewer a letter of reprimand signed by the ERC President.

In a last case, the Head of the Research Grants of an HI informed the ERCEA of email correspondence suggesting that an evaluator had contacted at least two scientists by email (one is an excluded reviewer, the other a postdoc supervisor of the PI), identifying himself/herself as evaluator of a proposal and disclosing the name of the PI. The panel reassessed the proposal after the panel meeting ignoring the review of the suspected reviewer.



When contacted, the reviewer claimed that there had been no breach of confidentiality concerning the evaluation. The reviewer had asked some scientific questions to colleagues to make a better assessment of the proposal, but never disclosed that he/she was evaluating for the ERC, neither the identity of the applicant. The ERCEA concluded that the reviewer did not breach confidentiality. The unanimous ColME decision was to write a mild letter, thanking the expert for the job and for the clarifications and very gently asking him/her to be more careful in the future.

Finally, there were two cases of undeclared potential conflict of interest of remote referees dealt with in 2015. The final decision after thorough analysis of both situations was that there was no conflict of interest.

Sharing of evaluation information (2015 case)

A PI, who submitted a redress request about his/her rejected application, contacted one of the panel members who had evaluated his/her proposal for clarification. It appears that the latter could have provided some inside information regarding the discussions held during the evaluation of the proposal. When giving out the mentioned information, the expert might have been in breach of the contract for independent experts. After thorough analysis, it was decided that the evaluator should be written a letter of reprimand, but not removed from the evaluation panel.

Plagiarism (2015 case)

A 2015 proposal seemed to have plagiarised a previously funded one. The 2015 proposal was anyway declared ineligible because the applicant applied the year before with a proposal that was rejected as category C and therefore could not submit a proposal in 2015. The PI and the HI were nevertheless contacted by the ERCEA in relations to the alleged plagiarism. Since after several iterations they never replied to the ERCEA requests, the case was not pursued further.

Conflict of interest (2015 case)

A case of potential scientific misconduct was opened triggered by information which appeared in the national press of an EU country concerning allegations of conflict of interest of an ERC grantee as member of the national Health Council of that country. It turned out that the potential Col was in fact related to the roles of the PI within the national research system and it was decided to follow-up the reactions of the authorities of the country in question. The ERCEA did not receive any information indicating that the national authorities were observing any Col and the case was not pursued further.



Cases where the last paragraph of Article 2.2 of the Code of Conduct for evaluators applies

According to the Code of Conduct for evaluators, in the following situations the ERCEA, in consultation with the ERC Scientific Council, has to decide whether a conflict of interest exists, taking account of the objective circumstances, available information and related risks. The decision may be that the evaluator takes part or not in the evaluation of the given proposal ('out of the room' rule) or of the entire call ('out of the call' rule) when the evaluator:

- i) was employed by one of the applicant legal entities in the last three years;
- ii) is involved in a contract or grant agreement, grant decision or membership of management structures (e.g. member of management or advisory board, etc.), research collaboration with an applicant legal entity or a fellow researcher or has been so in the last three years;
- iii) is in any other situation that could cast doubt on their ability to participate in the evaluation of the proposal impartially or that could reasonably appear to do so in the eyes of an external third party.

The ColME, on behalf of the Scientific Council, discussed 19 cases of this type of conflict of interest, with particular focus on cases of panel members being members of advisory boards and cases of scientific collaboration between panel members and applicants. The 'out of the call' rule was applied in four of the cases, while the 'out the room' rule was applied for the remaining 15 cases.

4.2 The ERC Executive Agency

The Executive Agency implements the actions under Part I 'Excellent science', which relate to the specific objective, 'Strengthening Europe's science base in frontier research', of the European Union's Horizon 2020 framework programme for research and innovation, according to the strategies and methodologies established by the independent ERC Scientific Council.

The Executive Agency operates on the basis of the powers delegated to it by the European Commission, which has the ultimate political responsibility for the implementation of the specific programme implementing the framework programme Horizon 2020.

Structure

The organisational structure of the Agency follows its operational and horizontal objectives. It consists of two operational departments (the Scientific Management Department and the Grant Management Department) and one Resources and Support Department. The accounting officer, the Communication Unit and the Support to the Scientific Council Unit report directly to the Director (see page 82).

Steering Committee



Pablo Amor
Director ERCEA

The Steering Committee of the ERCEA is the body that supervises the operations of the Agency and adopts amongst others its Annual Work Programme, administrative budget and Annual Activity Report.

It is composed of five members appointed by the European Commission for a (renewable) period of two years. The Steering Committee in office in 2016 was chaired by Robert-Jan Smits, Director-General of the Directorate-General for Research and Innovation, and comprised Kurt Vandenberghe, Director for Policy Development and Coordination in the same Directorate-General (who is the vice-chair of the Steering Committee); Henk Post, Director for Talent Management & Diversity – Executive Staff in the Directorate-General for Human Resources and Security; Tomas Jungwirth and Eva Kondorosi, both members of the ERC Scientific Council.



Robert-Jan Smits
*Director-General
DG RTD*

The ERCEA Steering Committee met 4 times in 2016 and took nine decisions on the ERCEA provisional accounts 2015, implementing rules to the Staff Regulation, the ERCEA draft administrative budget 2017, the revised organisation chart, the ERCEA final accounts 2015, the revision of the financial circuits for the ERCEA operational budget, the non-application of the Commission Decision on the maximum duration for recourse to non-permanent staff in the Commission services, the ERCEA Annual Work Programme 2017 and the ERCEA administrative budget 2017.

During 2016, the Steering Committee also took two decisions through written procedures (namely on the adoption of the Agency's Annual Activity Report 2015 and the amendment of the administrative budget 2016). In every meeting of the Committee, the ERCEA Director provides an extensive state of play of the activities of the Agency.

Staff and recruitment

The 2016 operating budget provided for the employment of 112 temporary agents, 333 contract agents (including 14 contract agents financed with the contribution of candidates and non-EU countries for their participation in H2020) and 16 seconded national experts, adding up to a total of 461 agents.

At the end of December 2016, the Agency employed a total of 461 agents thus reaching 100 % of the foreseen staff allocation: 112 temporary agents, 337 contract agents and 12 seconded national experts.

Figure 2: Gender distribution of ERCEA staff

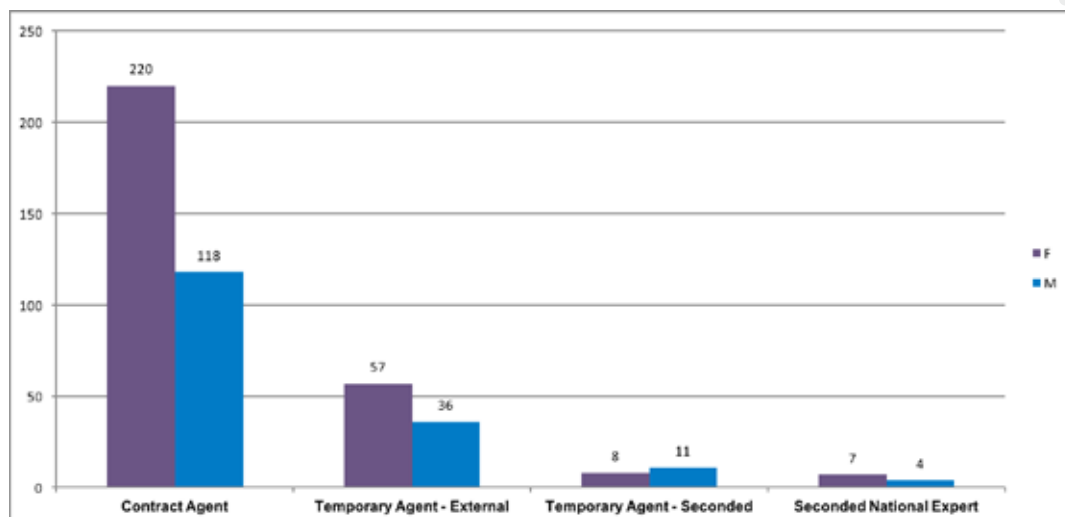
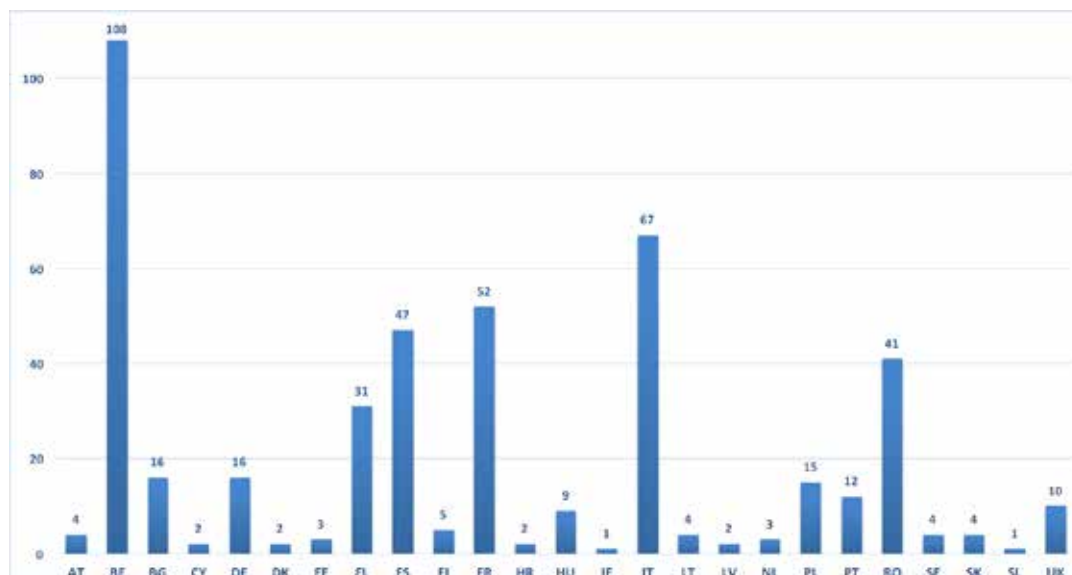


Figure 3: ERCEA staff by nationality



Statistics for December 2016 show that the Agency employs 63 % women and 37 % men. With regards to gender balance of highly specialised staff (temporary agents and contract agents function group IV), 56 % of the posts are occupied by women. At the end of 2016, the ERCEA employed nationals from 25 EU Member States.

The staff allocation of 2017 plans that the Agency will grow by 21 new staff out of a total of 140 new posts expected in the years up to 2020.

4.3 Communication

In 2016, the ERCEA Communication Unit strived to promote the ERC's mission to encourage the highest quality research in Europe, as well as to deliver targeted and relevant information to all stakeholders, the general public and the media on the ERC's activities and achievements. The communication activities focused on three main strategic pillars: consolidating and widening high-quality participation in ERC calls; highlighting projects and researchers funded by the ERC; increasing the visibility of the ERC and explaining its impact and achievements in Europe and across the world.

In order to ensure that excellent researchers from all over Europe and overseas are aware about the ERC and its funding schemes, the ERC organised and attended numerous events in Europe and abroad.

The ERC was present at many **conferences** and talks as well as attending and organising high-profile meetings. The ERCEA Communication Unit contributed to 29 scientific events, conferences, seminars, or career fairs. It specifically exhibited at initiatives such as the International Union of Anthropology and Ethnological Sciences Inter Congress in Dubrovnik (HR), for which a thematic brochure was published, the EuCheMS Chemistry Congress in Seville (ES) and the American Society of Cell Biology Congress in San Francisco (US). The ERC was also present at the EuroScience Open Forum (ESOF) in Manchester with over 40 ERC grantees attending, as well as the ERC President and ERC Scientific Council members. On this occasion a brochure focused on the grantees attending ESOF was produced. The event also represented an important opportunity to promote the ERC in the press. An ERC press conference with ERC President Jean-Pierre Bourguignon and Scientific Council member Dame Athene Donald announced the positive results of the report "Qualitative Evaluation of ERC-funded completed projects". This led to important coverage and interviews including in Nature Magazine and German national radio Deutschlandfunk. Overall, it was reported in some 14 media outlets in relation to this event.

The importance of the **international mission** of the ERC was reiterated by the launch of the campaign "ERC – Open to the World", in line with the ERC's mission and resonating with Commissioner for Research, Science and Innovation Carlos Moedas's "3 Os" strategy: Open Innovation, Open Science, Open to the World. It kicked off with President Bourguignon's participation at the New Einstein Forum Initiative in Dakar, Senegal. The Communication Unit also supported the international visits by ERC Vice-President Mart Saarma to South Africa and by President Bourguignon at the Global Research Council meeting in India.



ERC grantee Giulio di Toro explains his work to Commissioner Carlos Moedas at ESOF 2016 in Manchester



Scientific Excellence in Poland conference in March 2016

ERC representatives presented the ERC funding schemes at the “Destination Europe” event in the US, on the occasion of the MIT Career’s Fair and the AAAS conference. Moreover, ERC grant winners and personalities promoted the ERC at events organised by Euraxess Links ASEAN, India and Brazil, and contributed, for the first time with a webinar, to Euraxess Links Japan activities. This represents a particularly intensified cooperation effort with the colleagues from Euraxess Links and the EU Delegation offices.

Once again, the Communication Unit organised a meeting with the Commission’s Science Counsellors around the world to update them on the state-of-play of the ERC’s international endeavors focusing on overseas researchers.

As an important international arena, the ERC attended the World Economic Forum (WEF) summit in Davos, for the fourth time. This was an opportunity for the ERC to bring cutting-edge science beyond its usual audience. An ERC press conference with Commissioner Moedas, ERC President Bourguignon and grantee Prof. Hélène Rey took place, as well as numerous media interviews. This generated significant media coverage across Europe but also in China, India and the USA; some 50 items including prime time TV reports. The ERC also participated for the fifth time to WEF’s Annual Meeting of the New Champions, the so called “Summer Davos”, in Tianjin, China, with nine sessions. Here, the ERC was represented by twelve ERC grantees, as well as President Bourguignon and Vice President Mart Saarma, who gave numerous media interviews including major Asian outlets.

Finally, the Communication Unit was active in a series of events targeted at countries less successful in the ERC calls. ERC President Bourguignon took part in a press conference in Slovenia, resulting in a major interview in the main national newspaper, at the occasion of his meetings with the Slovenian Prime Minister and with the scientific community. On the occasion of the Slovak Presidency of the Council of the European Union, a delegation headed by Jean-Pierre Bourguignon, took part in the “ERC day in Slovakia”, meeting the Science Minister and the Finance Minister. Both events triggered positive media coverage.

Efforts to train and update the ERC grant holders continued in 2016 and the Communication Unit contributed to the “PI-event” organised in Lisbon in April by the ERCEA, with specific training sessions on science communication. The ERC National Contact Points (NCPs), based across Europe and further afield and serving as information multipliers to potential applicants, were continuously kept informed about ERC calls and relevant news updates. The NCP network met twice in Brussels and interacted with both the Scientific Council and ERCEA staff.



Grantee Elison Matioli attended the signing ceremony in Brussels of the Implementing Arrangement between the EU and his native country, Brazil

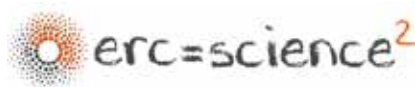


President Jean-Pierre Bourguignon at the Next Einstein Initiative Forum, in Dakar, launching the “ERC – Open to the World” campaign



To promote the achievements of ERC-funded research to a wider audience, the Communication Unit is supported by two **communication campaigns** funded by Coordination and Support Action (CSA) projects under Horizon 2020. Launched in 2015, they are developing activities in different European countries and various languages over four years.

The first campaign called ERC=Science² aims to engage new audiences focusing on a popular theme that changes every six months. Since its launch in February 2016, it has highlighted ERC-funded science around the themes of the 'urban planet' and 'food' through videos, articles, talks, open-lab events. A science 'pop-up' tent was displayed in science museums, universities, at European conferences, as well as congress centres and other public places. Overall, 15 public events took place in France, the UK, Czech Republic, Estonia, Belgium, Poland, Bulgaria, Cyprus and Croatia. The



ERC President and grantees at the launch of the ERC=Science² campaign in Brussels



The ERC=Science² booth has been travelling around Europe to promote ERC-funded research

second campaign, ERCcOMICS, showcases the achievements of ERC-funded projects exploiting the power of visual storytelling, producing and disseminating web comics and organising TED-like talks of ERC grantees illustrated by comic artists. Four webcomics have been running in parallel in 2016. Research in optical physics, sociology, climate research and artificial intelligence, can be discovered through the stories and the very innovative web navigation system linked to each one of them. The project shows increasing success, both in the scientific community and among the wider public, including the world of comic artists and readers. Media has also reflected this positive feedback, including major newspapers such as 'Il Sole 24 ore' and 'Le Monde'. In June, four "illustrated talks" were organised in Paris as part of the project, followed by two more in October in Amsterdam and Brussels (TEDxBrussels Women).

This year, more than 40 stories on **ERC-funded research** were promoted covering a wide range of topics, from novel therapies that starve the engine driving cancer cell growth to digital maps and how listening to jet-lagged plants gives insights into adaptation to changing environments for agricultural crops. Major discoveries by ERC grantees have been featured, for example, habitable Earth-like planets observed for the first time, or the earliest historical evidence of warfare unearthed by an ERC-funded team in Kenya, an archaeological rarity. Some of the stories were produced in active collaboration with the researchers and their host institutions. In addition, a few podcast and video features of ERC grantees complemented the traditional communication materials to help further disseminate grantees' research.

Project examples and research results were regularly featured through the ERC social media channels, press releases announcing call results, presentation slides and country information sheets, and grantees have been suggested as speakers for international and national events. The communication unit also collaborated with the Directorate-General for Research and Innovation, providing success stories for briefings and the 'EU Budget Focused on Results' initiative. In addition, more than 40 articles of the online Horizon Magazine featured ERC grantees, their research and results.



ERCcOMICS showcases the achievements of ERC-funded projects by exploiting the power of visual story-telling. Four webcomics have been published in 2016, having an increasing success, both in the scientific community and among the wider public, including the media.



More than 14 600 likes were reached by the end of 2016. The ERC Facebook page puts the spotlight on ERC grantees and their projects



A tool to provide timely information on calls, projects' results and events, counting almost 28 000 followers

During this year, over 35 press announcements were published. They covered topics such as the ERC 2016 call results, the re-launch of Synergy Grants and major overseas visits, amongst other things. In addition to this, the ERC press office facilitated around 30 media interviews for ERC President Bourguignon and other ERC personalities. Four issues of the ERC's newsletter 'Ideas' were published and sent to almost 35 000 subscribers to highlight the ERC's mission and activities as well as its funded research.

The Communication Unit renewed its efforts to improve the ERC's online presence, resulting in a significant increase in its reach on social media and of the total number of website visitors. With social media such as Twitter and Facebook now amongst the main channels for the dissemination of information, the ERC is making sure its presence there is strong not only by providing information, but also by doing it in an engaging and interactive manner. Followers of the ERC Twitter account continued to increase in 2016, reaching nearly 28 000. There was also a very substantial increase, over 40 % in the number of Facebook "likes" (from 10 250 to 14 600). More than 555 000 unique visitors consulted the ERC website in 2016.



A new functionality of the ERC website allows to explore ERC research stories and create your own booklet
<https://erc.europa.eu/projects-and-results/erc-stories>



Four issues of the ERC's electronic newsletter 'Ideas' were published in 2016



Several brochures featuring ERC projects and grantees were produced



Annexes



Members of the Scientific Council in 2016



Prof. Jean-Pierre BOURGUIGNON

- President, European Research Council
- Director Emeritus of Research at CNRS
- Director, Institut des Hautes Études Scientifiques (IHÉS), Paris, 1994-2013
- President, Société Mathématique de France, 1990-1992
- President, European Mathematical Society, 1995-1998
- Doctor Honoris Causa: Keio University, Japan and Nankai University, China
- Main research field: Mathematics



Prof. Klaus BOCK

- University of Copenhagen
- Chair, Danish National Research Foundation, 2004-2012
- President, Danish Academy of Technical Sciences, 2009-2011
- Awards: International Carbohydrate Award 1986, Alexander von Humboldt for Research, Samuel Friedman Foundation Rescue
- Main research field: Chemistry



Prof. Margaret BUCKINGHAM

- Emeritus director of research in the CNRS and professor at the Pasteur Institute, Paris
- Member of EMBO Council
- Member of the French Academy of Sciences
- Officer in the Ordre National du Mérite and in the Ordre de la Légion d'Honneur
- Gold medal of the CNRS (2013)
- Foreign/honorary member of the Royal Society of London/Edinburgh
- Main research field: biomedical implications for congenital heart malformations



Prof. Christopher CLARK

- Regius Professor of History at University of Cambridge, UK
- Senior Lecturer in Modern European History and Reader in Modern European History.
- Fellow of St. Catharine's College.
- Main works are 'Iron Kingdom' (2006), a history of Prussia, and 'The Sleepwalkers' (2012), on the origins of the First World War.
- Main research area: history of nineteenth-century Germany and continental Europe.



Prof. Athene DONALD

- Professor, Experimental Physic, Uni. Cambridge
- Fellow, Royal Society & Chair of its Education Committee,
- Dame Commander of the British Empire in 2010
- Member, Academia Europaea; Trustee Science Museum of London
- L'Oreal/UNESCO Prize for Women in Science, Laureate for Europe 2009
- Main research fields: Soft Matter & Biological Physics



Dr Barbara ENSOLI

- Director, National AIDS Center, Ist. Superiore di Sanità, Italy
- Vice-President: National AIDS Committee, Italian Ministry of Health
- Member, WHO-UNAIDS Vaccine Advisory Committee, European Molecular Biology Organisation (EMBO)
- Main research fields: HIV Pathogenesis; Development of HIV/AIDS Preventative & Therapeutic Vaccines



Prof. Thomas JUNGWIRTH

- Head of the Department of Spintronics and Nanoelectronics, Institute of Physics, Academy of Sciences of the Czech Republic (ASCR)
- Professor, School of Physics and Astronomy University of Nottingham, UK
- Main research field: physics and astrophysics condensed matter physics, materials science, electronic properties of nanostructures



Prof. Dr Ing Matthias KLEINER

- Head, Inst. for Forming Technology & Lightweight Construction (IUL), Uni. Dortmund
- President, German Research Foundation (DFG) 2007-2012
- Managing Director, Institute for Forming Technology & Lightweight Construction, 2004-2006
- DFG's Gottfried Wilhelm Leibniz Prize 1997



Prof. Eva KONDOROSI

- Research Professor, Biological Research Centre, Hungarian Academy of Sciences
- Research Director, Plant Science Institute, CNRS, France
- Main research fields: Rhizobium-legume Symbiosis with recent focus on plant controlled differentiation of bacteria



Prof. Dr Michael KRAMER

- Director and Scientific member at the Max Planck Institute for Radio Astronomy
- Professor for Astrophysics at the University of Manchester
- Herschel Medal of the Royal Astronomical Society in the UK (2013)
- Main research field: radio astronomy with a focus on the observations of pulsars for experimental tests of gravitational physics



Prof. Kurt MEHLHORN

- Director of the MPI for Informatics (Head of the algorithms and complexity group)
- Professor of Computer Science at Saarland University
- Member of German Academy of Sciences Leopoldina, Academia Europaea, the German Academy of Science and Engineering acadtech, the US Academy of Engineering, and the US Academy of Science.
- Main research field: theoretical computer science including data structures, computational geometry, parallel computing, complexity theory, combinatorial optimization and graph algorithms.



Prof. Barbara ROMANOWICZ

- Chair of Physics of the Earth's Interior at Collège de France, Paris
- Professor of Geophysics at the University of California, Berkley
- Elected to the US National Academy of Sciences in 2005 and appointed to the chair of Physics of the Earth Interior at Collège de France in Paris.
- Main research area: study of deep earth structure and dynamics using seismological tools, implementing numerical seismic wave field computations in seismic tomography.



Prof. Mart SAARMA

- Vice-President, European Research Council
- Academy Professor and Director Centre of Excellence Biotechnology Inst., Helsinki
- Nordic Science Prize 2008
- Main research fields: Neurosciences, Biotechnology



Prof. Nuria SEBASTIAN GALLES

- Vice-President, European Research Council
- Professor in Psychology, Dept. of Technology, Uni Pompeu Fabra, Barcelona
- Main research fields: Neural Cognitive Mechanisms underlying learning & language processing, special emphasis: Bilingual Populations



Prof. Niels Chr. STENSETH

- Professor and Chair, Centre for Ecological and Evolutionary Synthesis (CEES), University of Oslo
- Chair, Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change (NorMER)
- President, Norwegian Academy of Science and Letters (DNVA)
- Chevalier (Knight) in the French National Order of the Legion of Honour
- Main research fields: Ecology and Evolution



Prof. Martin STOKHOF

- Professor, Institute for Logic, Language and Computation (ILLC) and University of Amsterdam
- Member of the Dutch Royal Academy of Sciences
- Main research field: philosophy of language



Prof. Nektarios TAVERNARAKIS

- Director of the Institute of Molecular Biology and Biotechnology, at the Foundation for Research and Technology,
- Professor of Molecular Systems Biology at the Medical School of the University of Crete, Heraklion, Greece
- Member of the European Molecular Biology Organization, and Academia Europaea.
- Main research area: molecular mechanisms of necrotic cell death and neurodegeneration, the interplay between cellular metabolism and ageing, and the mechanisms of sensory transduction and integration by the nervous system.



Prof. Janet THORNTON

- Director of the European Molecular Biology Laboratory - European Bioinformatics Institute on the Wellcome Trust Genome Campus
- Dame Commander of the Order of the British Empire for services to bioinformatics
- Elected to the Royal Society in 1999
- Main research field: protein structural bioinformatics and the computational biology of ageing



Prof. Isabelle VERNOS

- Research Professor ICREA (Institutio Catalana de Recerca i Estudis Avançats), Centre de Regulació Genòmica, Barcelona
- Associated Professor Uni. Pompeu Fabra, Barcelona
- Member EMBO and ASCB
- Main research fields: Cell Biology



Prof. Dr Reinhilde VEUGELERS

- Full Professor, KU Leuven, Faculty Economics & Business, Belgium
- Senior Fellow at Bruegel; CEPR Research Fellow
- President, Belgian FNS-FNRS Scientific Committee on Social Sciences
- Member of: the Royal Flemish Academy of Belgium for Sciences, Innovation4Growth Expert Group
- Main research fields: Science & Innovation, Industrial Organisation, International Strategy



Prof. Michel WIEVIORKA

- Professor, Ecole des Hautes Etudes en Sciences Sociales, Paris
- Chair, Fondation Maison des Sciences de l'Homme, Paris
- Doctor Honoris Causa, Pontificia Universidad Católica del Perú
- Main research fields: social movements, racism, terrorism, violence, multiculturalism and cultural differences



Prof. Fabio ZWIRNER

- Professor of Theoretical Physics, Department of Physics and Astronomy "G. Galilei", University of Padua
- Chairman of the CERN Scientific Policy Committee (2011-13)
- Prof. of High Energy Particle Physics Board of the European Physical Society (2009-11)
- Main research field: physics and astrophysics

Panel Chairs of the ERC Peer Review Panels

ERC Starting Grant Panels 2016

Life Sciences

- LS1 Molecular and Structural Biology and Biochemistry: Prof. Tomi P. Mäkelä
- LS2 Genetics, Genomics, Bioinformatics and Systems Biology: Prof. Frank Grosveld
- LS3 Cellular and Developmental Biology: Prof. Anna Akhmanova
- LS4 Physiology, Pathophysiology and Endocrinology: Prof. Hellmut Augustin
- LS5 Neurosciences and Neural Disorders: Prof. Michael Brecht
- LS6 Immunity and Infection: Prof. Søren Riis Paludan
- LS7 Diagnostic Tools, Therapies and Public Health: Prof. Stefanie Dimmeler
- LS8 Evolutionary, Population and Environmental Biology: Prof. John N. Thompson
- LS9 Applied Life Sciences and Non-Medical Biotechnology: Prof. Leonor Cancela

Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations: Prof. Philip Hans B. F. Franses
- SH2 Institutions, Values, Environment and Space: Prof. Petter Pilesjö
- SH3 The Social World, Diversity, Population: Prof. François Héran
- SH4 The Human Mind and Its Complexity: Prof. Sonja Anette Kotz Cimon
- SH5 Cultures and Cultural Production: Prof. Caroline van Eck
- SH6 The Study of the Human Past: Prof. Maria Todorova

Physical Sciences and Engineering

- PE1 Mathematics: Prof. Ari Laptev
- PE2 Fundamental Constituents of Matter: Prof. Maciej Lewenstein
- PE3 Condensed Matter Physics: Prof. Gerrit Bauer
- PE4 Physical and Analytical Chemical Sciences: Prof. Marco Daturi
- PE5 Synthetic Chemistry and Materials: Prof. Horst Weller
- PE6 Computer Science and Informatics: Prof. Marta Zofia Kwiatkowska
- PE7 Systems and Communication Engineering: Prof. Peter Kennedy
- PE8 Products and Process Engineering: Prof. Christian Sattler
- PE9 Universe Sciences: Prof. Monica Tosi
- PE10 Earth System Science: Prof. Dorthe Dahl-Jensen

The list of all Panel Members is available at:
<http://erc.europa.eu/evaluation-panels>

Panel Chairs of the ERC Peer Review Panels ERC Consolidator Grant Panels 2016

Life Sciences

- LS1 Molecular and Structural Biology and Biochemistry: Prof. LaszloTora
- LS2 Genetics, Genomics, Bioinformatics and Systems Biology: Prof. Karen Steel
- LS3 Cellular and Developmental Biology: Prof. Arshad Desai
- LS4 Physiology, Pathophysiology and Endocrinology: Prof. Stefan Schulte-Merker
- LS5 Neurosciences and Neural Disorders: Prof. Gábor Tamás
- LS6 Immunity and Infection: Prof. Caetano Reis E Sousa
- LS7 Diagnostic Tools, Therapies and Public Health: Prof. Patrick Couvreur
- LS8 Evolutionary, Population and Environmental Biology: Prof. Jon Mikael Ågren
- LS9 Applied Life Sciences and Non-Medical Biotechnology: Prof. Birte Svensson

Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations: Prof. Thierry Mayer
- SH2 Institutions, Values, Environment and Space: Prof. Neil Adger
- SH3 The Social World, Diversity, Population: Prof. Peter K Smith
- SH4 The Human Mind and Its Complexity: Prof. Ron (George) Mangun
- SH5 Cultures and Cultural Production: Prof. Angela Esterhammer
- SH6 The Study of the Human Past: Prof. Susan Pfeiffer

Physical Sciences and Engineering

- PE1 Mathematics: Prof. Alfio Quarteroni
- PE2 Fundamental Constituents of Matter: Prof. Anne L'Huillier
- PE3 Condensed Matter Physics: Prof. Dragan Mihailovic
- PE4 Physical and Analytical Chemical Sciences: Prof. Jan M.L. Martin
- PE5 Synthetic Chemistry and Materials: Prof. Luis Liz-Marzan
- PE6 Computer Science and Informatics: Prof. Mogens Nielsen
- PE7 Systems and Communication Engineering: Prof. Mary O'Neill
- PE8 Products and Process Engineering: Prof. Aristide Massardo
- PE9 Universe Sciences: Prof. Conny Aerts
- PE10 Earth System Science: Prof. Paul Andriessen

The list of all Panel Members is available at:

<http://erc.europa.eu/evaluation-panels>

Panel Chairs of the ERC Peer Review Panels

ERC Advanced Grant Panels 2016

Life Sciences

- LS1 LS1 Molecular and Structural Biology and Biochemistry: Prof. Richard Treisman
- LS2 Genetics, Genomics, Bioinformatics and Systems Biology: Prof. Charles Auffray
- LS3 Cellular and Developmental Biology: Prof. Juergen Knoblich
- LS4 Physiology, Pathophysiology and Endocrinology: Prof. Susan Bonner-Weir
- LS5 Neurosciences and Neural Disorders: Prof. Marie-France Bader
- LS6 Immunity and Infection: Prof. Steffen Jung
- LS7 Diagnostic Tools, Therapies and Public Health: Prof. Paul Herijgers
- LS8 Evolutionary, Population and Environmental Biology: Prof. Jacobus Boomsma
- LS9 Applied Life Sciences and Non-Medical Biotechnology: Prof. Daniel Tomé

Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations: Prof. Rachel Griffith
- SH2 Institutions, Values, Environment and Space: Prof. Renaud Dehousse
- SH3 The Social World, Diversity, Population: Prof. Elizabeth Thomson
- SH4 The Human Mind and Its Complexity: Prof. Ruth Byrne
- SH5 Cultures and Cultural Production: Prof. Alessandro Schiesaro
- SH6 The Study of the Human Past: Prof. Martin Kenneth Jones

Physical Sciences and Engineering

- PE1 Mathematics: Prof. Jan Philip Solovej
- PE2 Fundamental Constituents of Matter: Prof. Olaf Scholten
- PE3 Condensed Matter Physics: Prof. Manijeh Razeghi
- PE4 Physical and Analytical Chemical Sciences: Prof. Thomas Rizzo
- PE5 Synthetic Chemistry and Materials: Prof. Jöns Hilborn
- PE6 Computer Science and Informatics: Prof. Daphna Weinshall
- PE7 Systems and Communication Engineering: Prof. Stephen McLaughlin
- PE8 Products and Process Engineering: Prof. Bernhard Schrefler
- PE9 Universe Sciences: Prof. Aleksander Wolszczan
- PE10 Earth System Science: Prof. Ingeborg Levin

The list of all Panel Members is available at:
<http://erc.europa.eu/evaluation-panels>

Top organisations hosting ERC Principal Investigators

The data are as of December 2016 - The grants distribution is according to the Participant Identification Code (PIC) of the current Host Institution, as appears in CORDA, the European Commission's database of projects. Please note that prior to the compilation of the table, the Helmholtz Association had requested the grouping of the PICs that corresponded to its research centres, providing the appropriate information to the ERC. The ERC may accept similar requests while compiling the list of the institutions that host the ERC-supported Principal Investigators and their teams.

Host Institution	Country	FP7 2007-2013			H2020 Calls		
		StG	CoG	AdG	StG	CoG	AdG
National Centre for Scientific Research (CNRS)	FR	130	15	66	56	68	17
University of Oxford	UK	56	11	61	22	25	14
University of Cambridge	UK	60	6	56	23	28	15
Max Planck Society	DE	45	6	50	41	18	18
University College London	UK	52	8	29	13	19	12
Swiss Federal Institute of Technology Lausanne	CH	44	2	37	9	13	11
Swiss Federal Institute of Technology Zurich	CH	30	3	47	15	4	11
Weizmann Institute	IL	43	10	28	12	13	4
Hebrew University of Jerusalem	IL	40	3	30	15	12	4
Helmholtz Association of German Research Centres	DE	33	5	16	17	23	4
National Institute of Health and Medical Research	FR	31	9	18	12	14	5
Imperial College	UK	38	2	22	11	12	1
University of Edinburgh	UK	20	1	24	14	13	11
University of Amsterdam	NL	16	3	17	22	11	2
University of Copenhagen	DK	18	3	13	14	18	3
Tel Aviv University	IL	14	1	14	26	9	2
University of Leuven	BE	25	5	15	9	6	5
Spanish National Research Council (CSIC)	ES	21	3	12	6	15	4
University of Munich (LMU)	DE	12		26	16	4	3
French Alternative Energies and Atomic Energy Commission	FR	33	2	10	7	3	6
Radboud University Nijmegen	NL	23	3	12	9	7	2
Utrecht University	NL	16	3	11	10	14	2
Delft University of Technology	NL	13	4	10	14	10	5
University of Bristol	UK	15	2	20	7	5	6
University of Zurich	CH	16	3	17	6	6	3
Leiden University	NL	19	1	13	6	8	3
University of Helsinki	FI	16		12	9	8	3
Technion - Israel Institute of Technology	IL	22	2	8	10	4	2
National Institute for Research in Computer Science and Automatic Control	FR	19		12	10	4	2
University of Manchester	UK	17	2	13	3	6	5
Technical University of Munich	DE	16	2	9	5	9	5
Karolinska Institute	SE	16	2	12	5	5	4
University of Warwick	UK	12	4	9	9	7	3



Agency structure





European Commission

EUR 28487 - Annual report on the ERC activities and achievements in 2016

Luxembourg: Publications Office of the European Union

2017 —84 pp. — 17.6 x 25.0 cm

ISBN 978-92-9215-048-8

doi: 10.2828/980974