HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

EUROPEAN COLLABORATIVE PROJECTS AND THE STORIES BEHIND THEM

The Impact of Research Cooperation

PUBLISHING INFORMATION

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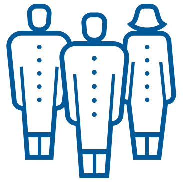
HELMHOLTZ AT A GLANCE

The Helmholtz Association brings together 18 scientific-technical and biological-medical research centers. With about 39,000 employees and an annual budget of more than € 4.5 billion, it is Germany's largest scientific organization.

The Helmholtz Association conducts top-level research to identify and explore the major challenges facing society, science and industry in strategic programs within six research fields: Energy; Earth and Environment; Health; Aeronautics, Space and Transport; Matter; and Key Technologies. The scientists research highly complex systems using large-scale devices and infrastructure, cooperating closely with national and international partners. The aim is to shape the future by combining research and technology development with perspectives for innovative applications and provisions in tomorrow's world.



Prof Dr Otmar D. Wiestler
President

Dear Reader,

The European idea is all about exchange, collaboration, and being stronger together. This is very much reflected in the field of science. Collaboration on all levels – national, European, and international – is often the only way to produce outstanding research findings and contribute to solving the major challenges facing society.

This is why the Helmholtz Association wants to emphasize the importance of the collaborative projects funded under the European Framework Programs, which establish close links between our researchers and their European partners.

These European collaborative projects are a unique instrument, enabling scientists to benefit from complementary skills and expertise. By integrating various stakeholders from academia and industry and creating synergies between them, we achieve results that would otherwise be impossible.

Collaborative projects have thus led to numerous success stories. I personally am especially proud of all our excellent researchers who have accepted the challenge and coordinate(d) major European consortia. Coordinating such a project is rewarding, but comes with a lot of responsibility. I would therefore like to express my appreciation to all of the people behind these projects!

With this brochure, we not only wish to acknowledge these achievements, but – first and foremost – to present examples of the research behind project acronyms, from the genome encyclopedia of "EUCOMMTOOLS" to the warehouse technology of "SafeLog". What impact do these projects have? How do researchers work across countries and disciplines? And where does the added value of collaborating on a European level lie?

Experience proves that these projects are particularly effective during basic or early-stage applied research, and when the partners from both academia and industry are not yet restricted by questions of Intellectual Property Rights. This is where European collaborative research can lay the foundations for the breakthroughs of tomorrow and beyond.

Kind regards,

Otmar D. Wiestler

DEFINITION

Collaborative research projects allow complex questions to be jointly tackled in any research field and along the entire innovation chain, from basic research to projects close to the market.

The term "collaborative research" is, however, less clear than one might think.

What kind of collaborative research projects are addressed in this publication?

We include research projects performed by researchers from several countries and organizations (e.g. research organizations, universities, industry, SMEs) in order to use complimentary expertise to solve complex questions. In Horizon 2020, these are funded via "Research and Innovation Actions" (RIA) and "Innovation Actions" (IA).

What kinds of projects are not included in this definition?

Being aware of conflicting opinions, Helmholtz does not consider research projects carried out under a grant to only one organization (e.g. most grants from the European Research Council) to be collaborative projects. Neither does the definition cover projects where the focus is not (yet) on conducting research, e.g. the "Coordination and Support Actions" (CSA) of Horizon 2020.

WHY DO WE NEED COLLABORATIVE RESEARCH?

THE RESEARCH POLICY PERSPECTIVE

Collaborative research maximizes a strength of the European research system: its diversity

Europe has a large number of excellent scientists and innovators across all research fields and in every country. By bringing them together within collaborative projects, Europe capitalizes on this wealth and creates the maximum number of synergies – which is where the real European added value lies. In these projects, ideas for innovations are created across disciplines. Industry and academia work together and can achieve results that have a significant impact on society. In Europe, more than 90% of investment in research occurs at the national level. European collaborative research joins the dots between national research activities, thereby making the overall system more effective. The best European players in a particular field have the opportunity to join forces, which in turn cross-fertilizes the national projects they are working on.

Collaborative research generates better results faster

Becoming an expert in any field of science takes years of training and practice. If complementary know-how and specialized expertise are needed for a new project, it is far more efficient to bring the leading experts in Europe together and benefit from their experience. Team science in general has been shown to have greater research impact and addresses global challenges more efficiently. Bringing complementary expertise together also leads to the improved development of new methodologies and standards.

THE SCIENTIST'S PERSPECTIVE

Collaborative research provides access to new know-how and allows new skills to be acquired. Problems can be solved faster and in a better way.

Collaborative research makes different research infrastructures – like vessels, aircrafts and synchrotons – and other resources needed for a specific project available, be they different soils or different viruses or patients. It allows tackling research questions with a European dimension on a European level. Collaborative projects provide improved opportunities for networking and exchange.

Undertaking a risky endeavor with strong partners and complementary skills allows for better risk-sharing and greater chances of mitigating unforeseen developments.

EUCOMMTOOLS
EUCOMM: TOOLS FOR FUNCTIONAL ANNOTATION OF THE MOUSE GENOME

Coordinator
Prof Wolfgang Wurst

Institution
Helmholtz Zentrum München – German Research Center for Environmental Health

Funding period
1 October 2010 to 30 September 2015

Total Costs
€18,169,877

EU Contribution
€11,999,673

Funded under
FP7-HEALTH

Number of partners
10

Project website
www.mousephenotype.org/about-ikmc/eucommtools

What is the project about?

“Mutations in certain genes of our genetic material were identified in many human diseases. However, this knowledge cannot be used for treatments without knowing the precise functions of these genes in our bodies. Gene functions can be systematically determined in mouse models by inactivating the genes and then analyzing the changes in physiological functions. For example, mutations in the MYO7A gene lead to hearing loss. This standard procedure commonly used before our project began was very inefficient. The EUCOMM/EUCOMMTOOLS project has developed new automated methods to determine the functions of all of the 20,000 protein-coding genes in mice.”

What were your specific research goals and why did you collaborate with European partners?

“The EUCOMM/EUCOMMTOOLS consortium and its international partners have been able to mutate and archive 18,500 of the 20,000 genes in mouse embryonic stem cells. These are now used all over the world to create mutant mouse strains to determine gene functions in the living organism. One of the cell archives used worldwide is located at the Helmholtz Zentrum München (EUMMCR). Such a large project requires expertise from many fields, such as molecular biology, cell biology, automation, statistics, computer science, and engineering sciences. That is why we have brought leading experts in these areas together in Europe. The project’s success can be seen, for example, in follow-up projects such as the International Mouse Pheno-typing Consortium (IMPC). Gene functions are currently being determined worldwide using the 18,500 mutant cells that were produced.”

What impact did the project have?

“A gene function catalog – an “Encyclopedia of Life” – is currently being created, building on the EUCOMM/EUCOMMTOOLS materials. More than 400 genes that cause embryonic developmental disorders have already been detected using this resource. Additionally, over 360 disease models have already been identified. They help to understand the molecular mechanisms of these diseases and develop new therapies. With this knowledge of gene functions, it will be possible to come up with new and innovative treatments for common diseases such as cancer, heart attacks, dementia, and diabetes.”

(bh)

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CHANGING PERMAFROST IN THE ARCTIC AND ITS GLOBAL EFFECTS IN THE 21ST CENTURY

Coordinator
Prof Hans-Wolfgang Hubberten, together with Dr Julia Boike and Prof Hugues Lantuit (Foto)

Institution
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research

Funding period
1 November 2011 to 31 October 2015

Total Costs
€9,343,585

EU Contribution
€6,951,895

Funded under
FP7-ENVIRONMENT

Number of partners
18

Project website
http://www.page21.org

What is the project about?

“Our project is about permafrost soils in the Arctic. These are soils that are, technically speaking, always frozen – these make up about a quarter of the land area in the Northern Hemisphere. I emphasize the phrase “technically speaking” because the permafrost soils in the high northern latitudes are now thawing at a greater rate than before. We must assume that the permafrost areas will decrease in extent. This is a problem because a great deal of carbon is stored in these soils, where plant remains have been trapped for thousands of years. As the permafrost thaws, the carbon becomes accessible to bacteria, which process it and release it as carbon dioxide or methane. Both gases increase the greenhouse effect, thereby accelerating climate change.”

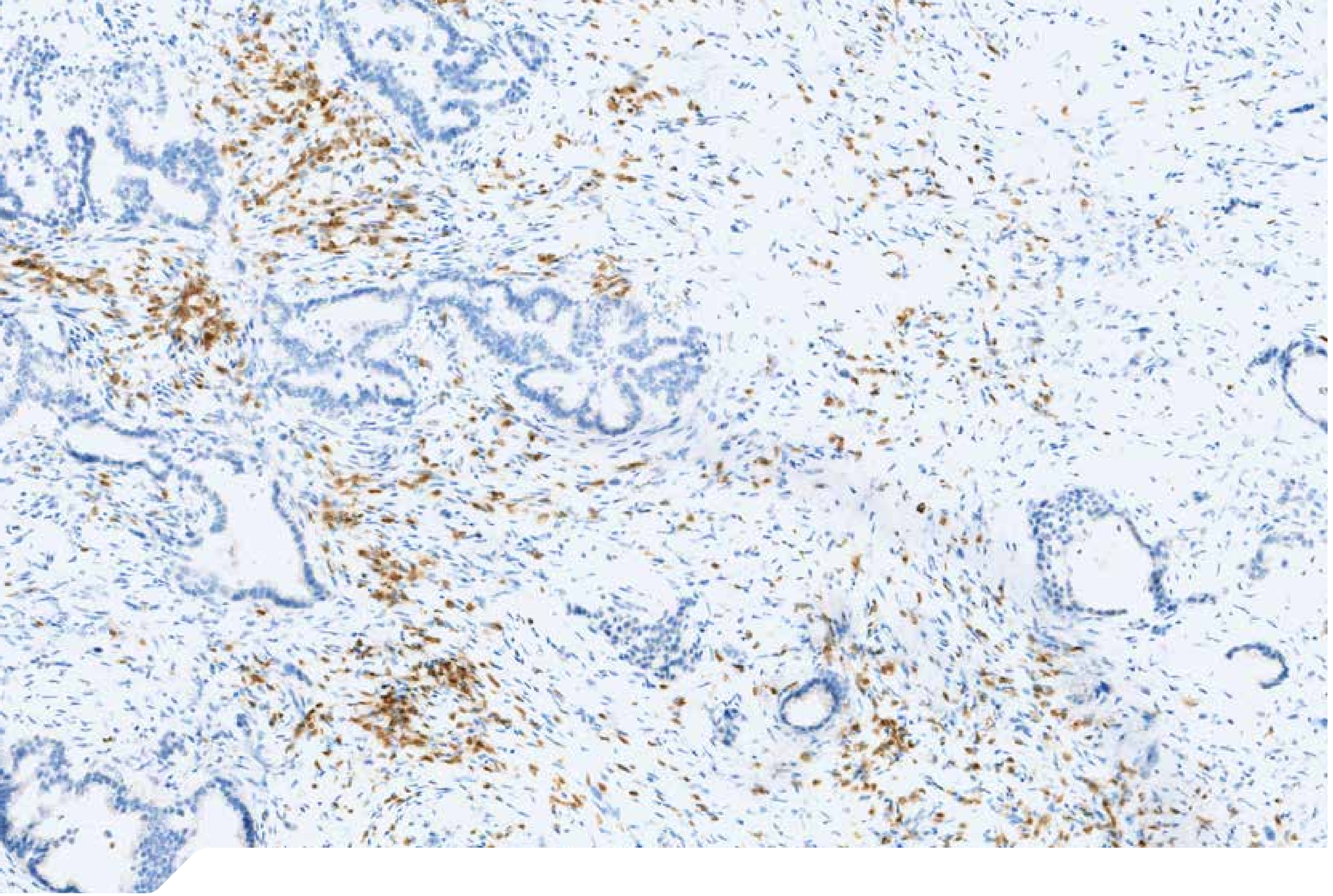
What were your specific research goals and why did you collaborate with European partners?

“We looked at the vulnerability of the soils and wanted to understand the feedback effects produced by rising temperatures: What are the impacts of the changes that are happening in the permafrost regions on the rest of the globe? To answer this question, we had to combine field work and modeling. Such a topic cannot be tackled at a national level. We cooperated with European partners and scientists from Canada, Russia, the US, and Japan. Many different disciplines such as thermal physics, geochemistry, and hydrology were brought together for the project. We took measurements and samples from Alaska to Greenland to Russia, in order to obtain a robust dataset against which models could be validated.”

What impact did the project have?

“Permafrost had previously not been considered in climate models. We were able to demonstrate that thawing permafrost soils will cause a temperature increase of 0.3 degrees Celsius by 2100. This is a significant factor, keeping in mind the limited leeway we have when it comes to climate change. Our results have been incorporated directly into the reports of the IPCC (International Panel on Climate Change), which in turn serve as a decision-making basis for politicians or ministries. It was great that we also managed to get ordinary people interested in the subject through our blog posts from the Arctic. From a scientific point of view, it is essential for the cooperation to continue, even though the project itself was completed in 2015. Our networks still exist, we developed common standards during the project, and we are working together on even better models.”

The interview was conducted with Prof Hugues Lantuit. (ka)



"STARTING UP THE IMMUNE ENGINE"

When it comes to cancer research, immunotherapy is in the limelight these days. However, not all patients respond equally to the currently available immunotherapies. The partners in the EU IACT project are working on an alternative approach towards immune cell activation. Rienk Offringa coordinates the project.

Mr Offringa, you are an oncologist and work in the field immunotherapy – could you explain the background of this research?

We know from mouse models that tumors can be recognized by the immune system, in particular by one type of white blood cell called T-lymphocytes. However, these mouse studies have also shown that the spontaneous T-cell response is often not strong enough to destroy the tumor. This is due to the fact that the immune response is tightly regulated. Normally, this is good: Negative signals prevent an over-reaction of the immune system. If not, we would all suffer from autoimmune diseases. In the case of cancer, the aim is to overrule immune regulation with so-called checkpoint inhibitors. These are antibodies, highly specific molecules, that block suppressive signals and thereby create a shift of balance. This knowledge has already led to the development of approved drugs that have become the standard of care for metastatic melanoma, for which until recently chemotherapy was the only treatment option. However, not all patients respond to that kind of therapy. Just inhibiting negative signals is not enough in every case – it is like taking your foot off the brake in your car. This achieves very little if the engine is not running.

How would you describe your research goal?

Our focus is the development of new cancer immunotherapy drugs. To use the same analogy again: We want to start the engine and step on the accelerator. Instead of blocking inhibitor signals, we can also use antibodies to deliver activatory signals to the immune cells. We thereby supplement stimulatory signals that are lacking in the tumor microenvironment. In mice, we have already seen very good results, but now we need to test this concept in the clinic, the ultimate goal being clinically approved drugs and treatments. It needs to be said that this approach is more risky than the aforementioned checkpoint inhibitors – accelerating brings greater risk of accidents than just taking your foot off the brake.

What made you tackle this topic within an EU project?

Right before I came to the German Cancer Research Center, I had worked in industry in the US on these so-called agonist immunostimulatory antibodies (IS-Abs) and it was important to me to continue that work in academia in close collaboration with strong European partners. This project involves experienced partners from both academia and industry. First and foremost, I wanted a coherent and focused group with clear common goals. Only then is it realistic to make progress.

What are the steps you take and who are your partners?

The project has three main objectives: Pre-clinical validation in mouse models, running clinical trials with existing drugs and developing a next generation of IS-Ab drugs for follow-up studies. We already have clear ideas on how to improve them, and for this development phase we specifically included four biotech companies in the consortium. The academic partners are universities, university hospitals and research institutions in Spain, Italy, the UK, and Germany.

Were you facing specific challenges?

We unfortunately couldn't always stick to our schedule. The devil is in the details when it comes to questions of sub-contracting, Intellectual Property Rights, drug manufacturing, and clinical trial planning. It is worth the trouble, though. For me personally, science is more than l'art pour l'art; I strive for more than a high-ranking publication. What motivates me most is to bring new treatment options to cancer patients.

What are the next steps?

I think it is important to follow up on this project. Good networks are essential for that. With respect to our research question, we have clear ideas on how to proceed. I am currently on the lookout for a suitable framework in this regard. A further EU project would be ideal to capitalize on the knowledge and experience we have gained in IACT.

(ka)

IACT – Immunostimulatory Agonist antibodies for Cancer Therapy

Coordinator: Prof Rienk Offringa
Institution: German Cancer Research Center
Funding period: 1 November 2013 to 31 October 2017
Total Costs: €8,227,908
EU Contribution: €5,995,747
Funded under: FP7-HEALTH
Number of partners: 9
Project website: http://www.iact-project.eu

THE FUTURE LIES AT OUR FEET

Geothermal energy is an almost inexhaustible energy source. The GEISER project has made it possible for us to understand underground processes and develop strategies to minimize seismic events. Geohydraulic and earthquake specialists are combining their expertise to safely exploit geothermal energy.

Fossil energy sources such as coal and gas intensify climate change. Because of this, the future lies in renewables. Solar and wind power have gotten a lot of attention but are not always available. Therefore, it is advantageous that yet another energy source is available everywhere and at all times: geothermal energy. A continuous flow of heat rises to the surface from within our planet. Around 30 percent of the energy flow that rises to the surface comes from the Earth's hot core itself. 70 percent comes from the constant decay of natural radioactive elements in the Earth's mantle and crust. "We have measured temperatures of up to 500 degrees Celsius in the hottest boreholes on our planet," says Ernst Huenges, head of geothermal research at the GFZ German Research Centre for Geosciences in Potsdam. "Even in central Europe, where there is no volcanic activity, we have measured temperatures of 200 degrees five kilometers below ground."

Geothermal energy is already used as an energy source, but only to a limited extent. "Small seismic events – earth tremors – have occurred during geothermal projects, compromising public acceptance of the extension of the technology. We have brought researchers together from all over Europe in order to secure responsible development and thus to be able to use the enormous potential in the future on a much larger scale," reports Huenges. From 2010 to 2013, the scientist coordinated the Geothermal Engineering Integrating Mitigation of Induced Seismicity in Reservoirs (GEISER) project. Over three years, specialists from 13 different research institutions and industry addressed these challenges under the leadership of the GFZ.

„We have brought researchers together from all over Europe in order to secure responsible development."

At first glance, the principle of geothermal energy usage is simple. You drill a hole into the ground to access hot groundwater, which is then used for heating or to generate electricity. The cooled water is pumped back into the ground through a second hole. Beforehand, the ground must be thoroughly studied. "We use reflection seismology, for example, to graphically depict the upper crust of the Earth. Sound waves are sent underground, reflected by the different subsurface layers, and registered on the surface by measuring devices. They provide us with a detailed image of what is beneath the surface." Seismic activity may occur in some places. "We use monitoring measurements during the construction and operation of geothermal plants," says Huenges, "to make the right decisions at the right time based on the additional information in order to avoid unwanted seismic events."

Using the model and the monitoring data, thresholds can be determined for all hydraulic measures – namely set volume flows for water – during the construction or operation of the installations, so as to avoid tremors. Now, many places that were previously considered unsuitable for geothermal use can be exploited as a result of such a procedure. Deep geothermal reservoirs will be stimulated thanks to the GEISER procedures. This hydraulic measure enables the economic use of low-permeable geothermal reservoirs. The GFZ is now responsible for coordinating the subsequent EU project DESTRESS (Demonstration of Soft Stimulation Treatments of Geothermal Reservoirs) involving 16 partners, in which the new procedure is implemented as "soft stimulation". For this purpose, geothermal wells will be stimulated in Switzerland, France, the Netherlands, Lithuania, and Korea until 2020. "Such research projects would not be feasible on a national level," says Huenges. "By pooling our expertise internationally, we are accelerating the next steps of the energy transition."

(lk)

GEISER – Geothermal engineering integrating mitigation of induced seismicity in reservoirs

Coordinator: Prof Ernst Huenges

Institution: Helmholtz Centre Potsdam - GFZ German Research Centre for Geosciences

Funding period:
1 January 2010 to 30 June 2013

Total Costs: €7,115,977

EU Contribution: €5,308,869

Funded under: FP7-ENERGY

Number of partners: 12

Project website: www.geiser-fp7.fr

SLOWING DOWN CLIMATE CHANGE WITH NANOSTRUCTURES

Coal-fired power plants and cement plants are notorious carbon dioxide emitters. In order to change that, Wilhelm Albert Meulenberg has initiated and coordinated a network throughout Europe. After three years of research, the basis had been created with ultra-thin membranes, and the second step has already been taken.

Mr Meulenberg, one of your goals is to capture pure carbon dioxide. How does this slow down climate change?

If we want to prevent this gas from entering the atmosphere, we have to make sure that the gas is separated and thus cannot be emitted by coal-fired power plants and cement plants. If combustion can be done without the presence of nitrogen the highly concentrated CO_2-flue gas can be captured. Then, it can be stored or even reused. This is called Carbon Capture and Utilization, short CCU. An important first step is to filter the pure oxygen from the air. We have sought out the right materials and structures to do so.

NASA-OTM – NAnostructured Surface Activated ultra-thin Oxygen Transport Membrane

Coordinator: Dr Wilhelm A. Meulenberg
Institution: Forschungszentrum Jülich
Funding period:
1 September 2009 to 31 August 2012
Total Costs: €4,978,135
EU Contribution: €3,200,363
Funded under: FP7-NMP
Number of partners: 7
Project website:
http://www.nasa-otm.eu

After three years of interdisciplinary and international research, we had reached our goal. On a small scale, we developed stable and robust ceramic oxygen transport membranes. This means it can now be continued on a larger scale.

During the first step, you built membranes with special structures. What does that mean?

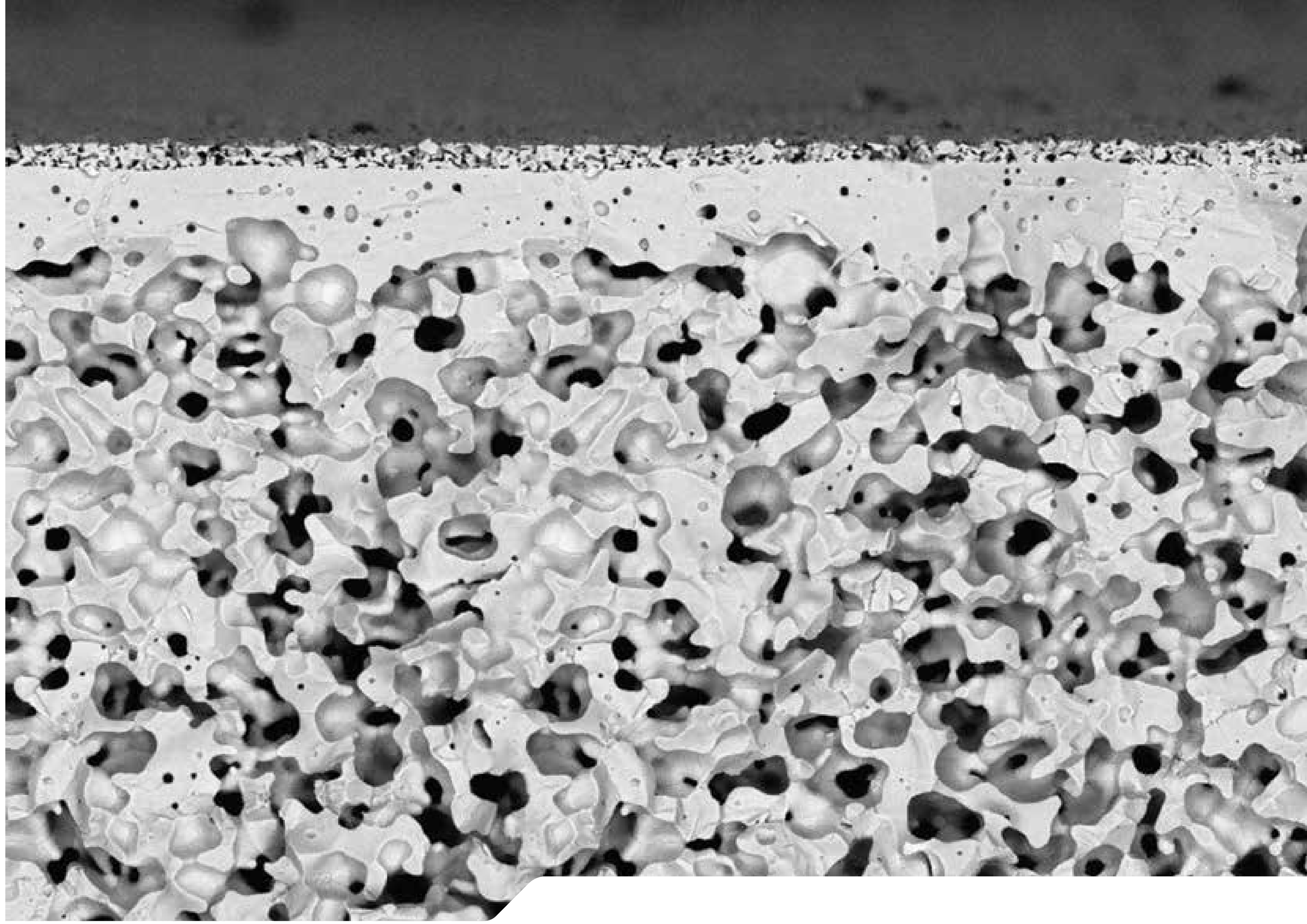
We developed discs measuring 15 millimeters in diameter. They work like a lattice that only lets the oxygen ion – a negatively charged particle – pass through to the other side. The nitrogen retains its molecular form and cannot be transported through the lattice. In the beginning, we wondered which materials would be best suited for this and how they could be used to create a stable structure that would also later act as a filter at a power plant.
In practice, the whole thing has to be designed to be robust and long-lasting. At the same time, the membranes must be extremely thin and therefore deposited on a highly porous support to maximize flux.

You developed these discs with researchers from all over Europe. Why such a large network?

It functions like a precision clock mechanism with many interlocking gears. Every university, every research institute, and the industrial partners contributed their unique skills. Researchers from Riga, for example, used data from Jülich (Germany) to calculate on the computer how the materials behave. Our colleagues in Spain specialize in catalyst research. In turn, we provide the membrane material and membrane structure. As coordinators, we brought everything together in Jülich in such a way as to achieve the desired final outcome.

How does this collaboration work throughout Europe?

In the European research community, we generally know our fellow researchers to a certain degree. We had already previously worked with our partners in Denmark and Spain. Some of the scientists themselves have also moved around quite a lot. The network is then intensified by such a specific research project. We meet twice a year at the European level, report on our progress, analyze bottlenecks, define upcoming milestones, and adjust our overall strategy accordingly. Subgroups go into even more detail during their regular meetings.



What effect will the membrane structures have on a large scale?

We created oxygen transport membranes (OTM) on a very small scale during our first project. The project was so successful that we added a second one, which run until the end of 2017. Nearly all of the partners were on board for the second project. Our new module, with an area of 420 square centimeters, is already significantly larger. Additionally, we were examining issues regarding installing the membrane into a device. Our goal is to install even larger versions of such membranes to act as “gas separators” in coal-fired power plants and cement plants in the future. It might also be possible to install them at refineries and petrochemical plants. This could enable us to massively reduce carbon dioxide emissions – and slow down climate change.

(lk)

"WE MUST URGENTLY FLIP THE SWITCH"

The "two-degree goal" has become a byword since the 2015 Paris Climate Change Conference. In order to limit climate changes, the participants at the 2015 Paris Conference decided that the Earth must not warm up any further. The EU IMPACT2C project had previously investigated the consequences of a global temperature increase of two degrees Celsius.

A time-lapse map shows how the sea will change European coastlines little by little as the sea level rises. Much land will disappear underwater, as illustrated by the simulation presented on an online news portal – a message that gets through to the users. But this is just a taste of the impacts of climate change. The increase in global temperature will lead to far more than rising sea levels.

"We wanted to show what Europe would look like in the event of a temperature increase of two degrees Celsius above pre-industrial levels," says Daniela Jacob, Director of the Climate Service Center Germany. She has been working in climate research for a long time and coordinated the EU project IMPACT2C. "Our goal was to get a consistent picture of the impacts – across various sectors," she explains.

To this end, scientists from 29 partner institutions have investigated how rising temperatures affect climate, energy, health, agriculture, and forestry, as well as ecosystems, water, tourism, and Europe's coasts. Some vulnerable regions outside Europe were also analyzed, with the help of experts from Bangladesh and the Maldives.

"Even if the two-degree limit is not exceeded, we will still see substantial changes in all the regions and sectors that were investigated," reflects Daniela Jacob. This may correspond with how many people see this issue – but the important thing is to scientifically prove the impacts and look at the system as a whole. For example, what kind of reciprocal effects occur?

In the energy sector, the researchers discovered that the potential for generating electricity from wind and solar power is unlikely to change. In hydropower on the other hand, we can expect to see varying developments. While it could become more important in northern Europe, a decrease in potential of around 20 percent is likely to occur in Croatia. Another example: Household energy consumption could decline in several countries if homes do not require as much heating due to higher outdoor temperatures.

In order to be able to come to such conclusions, all of the scientists worked with the same climate data in their models. Daniela Jacob recounts, "We set up a clear data protocol while still taking into account the needs of the different disciplines – the forestry sector thinks in terms of decades, while the agricultural sector is more short-term. But our common data basis is the key to a reliable overall picture. It was also important to separate weather fluctuations from climate changes in the calculations."

"Our goal was to garner political understanding of the fact that limiting the temperature increase to two degrees is absolutely essential."

The studies also reveal regional winners and losers. For five of the investigated sectors, the consequences are considerably harsher in southern Europe. "Once water becomes scarce there, sectors such as tourism and agriculture will compete for resources even more," adds Jacob.

Winter tourism is a sector which is already visibly changing for many people – solely due to decreasing amounts of snow. Even if temperatures were to increase by up to two degrees, some ski resorts in Europe would still remain open, according to the scientists. However, the length of the season would be shortened in many places, putting ten million overnight stays in Europe at risk; Austria and Italy would be the most severely affected in economic terms.

The researchers were able to present their results at the Climate Change Conference in Paris in 2015. "Our goal was to garner political understanding of the fact that limiting the temperature increase to two degrees is absolutely essential. We have additionally compiled and presented our information in a web atlas." This now serves as a sample project: Even non-European institutions want to use the atlas as an example on which to base their own comprehensive models – the Chinese weather service, for example, wants to provide similar information for China.

"Up until 2025 at most, we still have time to flip the switch in order to adhere to the two-degree goal. If we do not achieve this and if we reach an increase of four degrees or more, then we will experience massive changes beginning by 2040 at the latest. It would then be much more difficult to deal with the consequences," stresses Daniela Jacob.

(ka)

IMPACT2C – Quantifying projected impacts under 2°C warming

Coordinator: Prof Daniela Jacob

Institution: Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research

Funding period:
1 October 2011 to 30 September 2015

Total Costs: €8,447,373

EU Contribution: €6,500,000

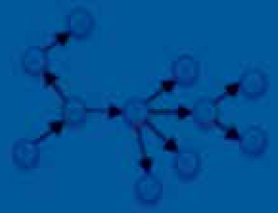
Funded under: FP7-ENVIRONMENT

Number of partners: 28

Project website:
http://impact2c.hzg.de

Web atlas:
http://atlas.impact2c.eu

Biological pathways

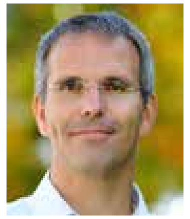


Co-expression network in the rat

Genotype & sequence data in different rat strains

EURATRANS

EUROPEAN LARGE-SCALE FUNCTIONAL GENOMICS IN THE RAT FOR TRANS-LATIONAL RESEARCH



Coordinator
Prof Norbert Hübner

Institution
Max Delbrück Center for Molecular Medicine in the Helmholtz Association

Funding period
1 April 2010 to 31 March 2015

Total Costs
€13,695,674

EU Contribution
€10,500,000

Funded under
FP7-HEALTH

Number of partners
18

Project website
http://www.euratrans.eu

What was the project about?

“Many of the major common diseases such as high blood pressure or back pain are multi-factorial diseases, meaning they are influenced by many factors. The risk of becoming ill is determined by the various expressions of a person’s genes and by environmental factors. In order to understand the link between disease and such risk genes, we must understand their effects at the molecular level, so that we could, for example, develop targeted treat-ments in the future.”

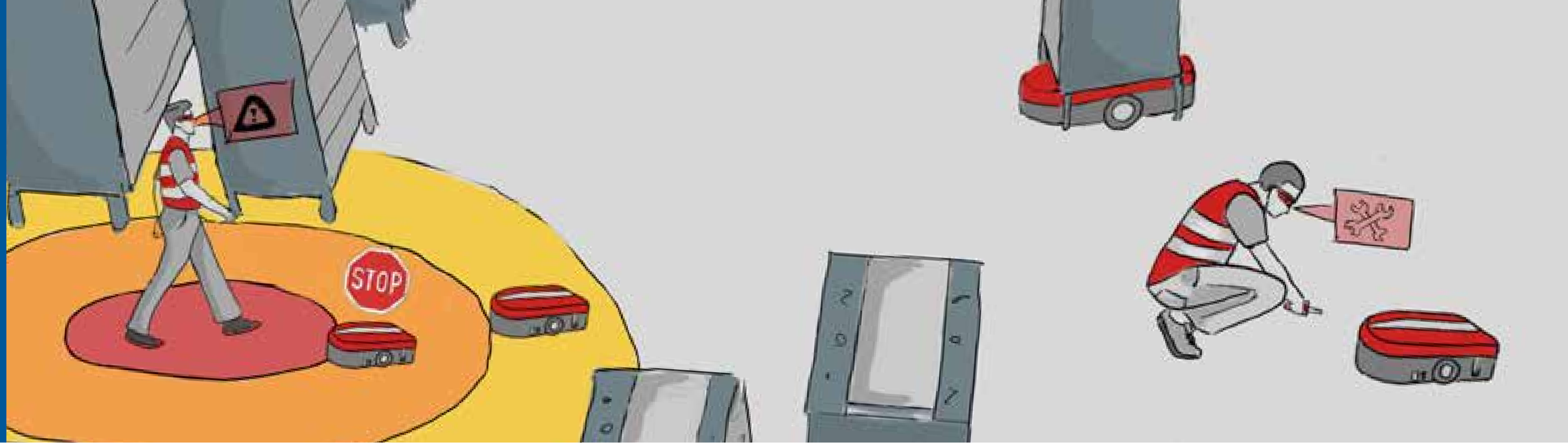
What were your specific research goals and why did you collaborate with European partners?

“We investigated risk genes in rats, since these animals have similar diseases to humans, such as high blood pressure or arthritis. In doing so, we analyzed whether these risk genes change molecular networks in the cell. We thus researched gene expression – meaning the implementation of gene information in proteins in the heart, for example. By doing this, we wanted to show which regulatory networks influence certain diseases. In order to achieve these goals, we needed a team of specialists in the respective field, which we fortunately compiled from all over Europe for the project.”

What impact did the project have?

“We were able, for instance, to show that the protein RBM20 regulates the function of an entire gene network, something significant for the heart. In humans, changes in RBM20 could lead to a myocardial disorder with enlargement of the heart and ultimately to heart failure. Interestingly, the protein RBM20 also regulates many genes that could cause such a myocardial disorder if mutated. RBM20 is a sort of molecular switch that controls a whole series of disease-relevant genes in the heart. Current investigations here at the Max Delbrück Center for Molecular Medicine in Berlin are expected to now show whether or not the protein RBM20 can be influenced by drugs and used therapeutically. This could open up entirely new treatment possibilities for patients with cardiac insufficiency.”

(bh)



SAFELOG

SAFE HUMAN-ROBOT INTERACTION IN LOGISTIC APPLICATIONS FOR HIGHLY FLEXIBLE WAREHOUSES

Coordinator
Prof Björn Hein

Institution
Karlsruhe Institute of Technology

Funding period
1 January 2016 to 31 December 2019

Total Costs
€4,618,463

EU Contribution
€4,618,463

Funded under
H2020-LEIT-ICT

Number of partners
5

Project website
http://safelog-project.eu

What is the project about?

“Various concepts currently exist for warehouse organization at distribution centers. Typically, either humans or robots work at these facilities. Our research idea is to combine these two approaches in order to make the processes more efficient. This, however, presents particular challenges, as humans and robots can get dangerously close when working side by side. That is why our project is examining the question of how human safety can be guaranteed when sharing the workplace with mobile robots.”

What are your specific research goals and why are you collaborating with European partners?

“Specifically, we are researching with universities in Prague and Zagreb whether robots can be redirected timely enough so as not to put humans at risk. Our Croatian partners – the University of Zagreb and the company Koncar – want to develop a safety vest that communicates with ro-bots and guarantees safety by stopping all robots that come too close to the worker wearing the vest. In addition to this, we are working on a “fleet manager” with Swisslog and the Fraunhofer Institute for Material Flow and Logistics. The fleet manager is supposed to safely guide humans and robots around the facilities. We use augmented reality glasses that display the optimal route for the human, so that he knows where he is authorized to go and what products he is to retrieve. These challenges require experts in planning, localization, safety, interaction, and of course expertise regarding implementation. We have found this knowledge in our partners.”

What impact is the project intended to have?

“The results will make the management of goods at warehouses significantly more efficient and therefore more economical. These days, you have to equip the robots with two safety laser scanners to avoid accidents. That is very expensive and we want to change that. We also want to fit out very large warehouse systems. A small warehouse has perhaps 50 to 100 robots moving about. In practice, distribution systems are currently halted for around 20 minutes every day due to malfunctions. Larger warehouses, however, have even more robots. As a result, the prob-ability of malfunctions is increased and the system is halted more often, as damages have to be repaired by a service technician. We want to make it possible for them to go in safely to perform these repairs and maintenance work.”

(bh)

SOLUTIONS

SOLUTIONS FOR PRESENT AND FUTURE EMERGING POLLUTANTS IN LAND AND WATER RESOURCES MANAGEMENT

What is the project about?

“It is well known that water pollution places a strain on ecosystems and human health. The impact of toxic chemicals is often immediately discernable. Although there is already an abundance of data, we still lack a comprehensive assessment: What impacts do certain chemical mixtures have on the ecological state of bodies of water? Many problems only arise once pollutants have been combined, so it is not enough to simply analyze the concentration of individual substances. That is why we at SOLUTIONS use cells and test organisms to specifically identify substances that have effects on aquatic organisms such as algae, fish, and plants, and ultimately on the water quality.”

What are your specific research goals and why are you collaborating with European partners?

“Many water condition assessments are based exclusively on monitoring data – we now also use modeling in order to be able to make predictions. For example: We have already been able to make pretty good projections on pollution in the Danube region from detergents, medications, and pesticides – based on sales figures, land use, and data on gross national product. We verify these predictions in case studies.

However, we not only want to describe the state of water bodies, but also to manage and improve it. Unifying these concerns is extremely important. Through SOLUTIONS, we demonstrate which combinations of measures are promising for reaching certain conservation goals, such as preserving valuable ecosystems or achieving adequate drinking water protection. Where do we need to upgrade wastewater treatment technology to reduce pollution from households, for example?

Coordinator
Prof Werner Brack

Institution
Helmholtz Centre for Environmental Research – UFZ

Funding period
1 October 2013 to 30 September 2018

Total Costs
€16,323,010

EU Contribution
€11,988,935

Funded under
FP7-ENVIRONMENT

Number of partners
39

Project website
http://www.solutions-project.eu

These tasks require a broad range of expertise, both technologically and scientifically, that can only be sourced at a European level. And of course water quality is, by its very nature, a cross-border problem. The 39 project partners are located between Serbia and Sweden. We also have partners from Brazil and China. Strong European environmental research that is also open to international partners and closely links basic research and application is indispensable for sustainably using our resources.

What impact is the project intended to have?

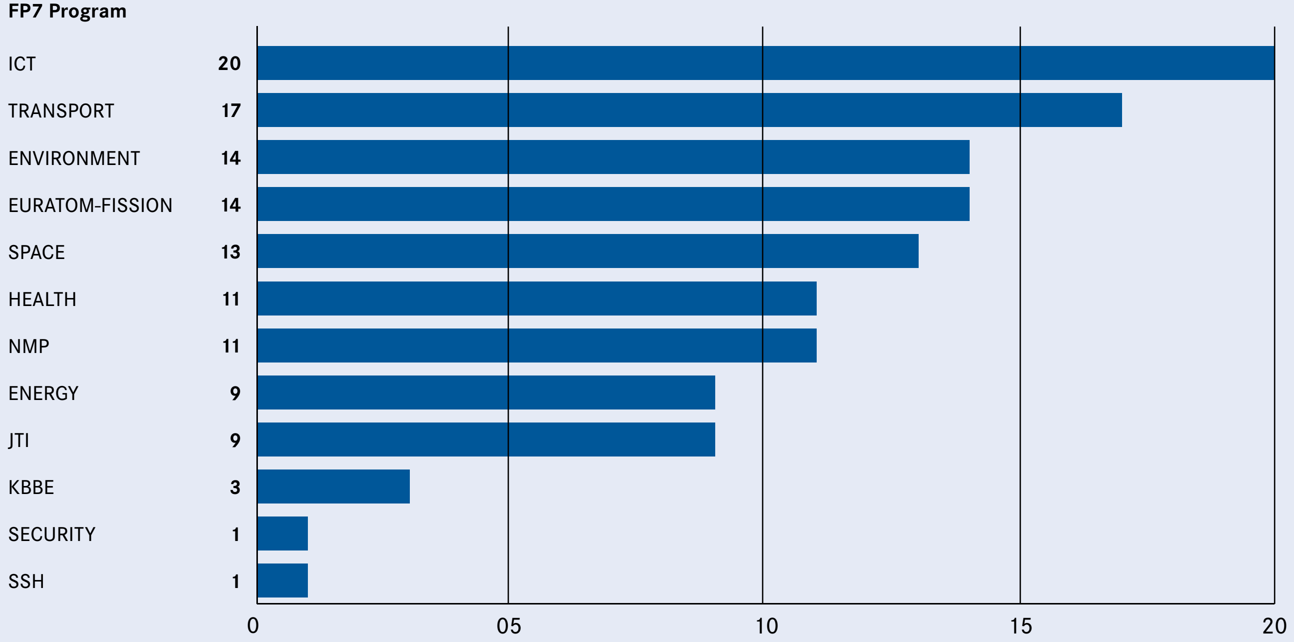
“We cannot smell or taste the chemicals we study in our investigations. However, their impacts affect each and every one of us. It all comes down to whether or not organisms that are of high value to the ecosystems return to our waters, whether fish from these aquatic areas are edible, and ultimately the quality of our drinking water.

It is important to us that we work in a solution-oriented manner. Through our project, we want to contribute to improving water quality in Europe’s river landscapes. That is why we have involved those who use our results – from international river basin commissions to the drinking water industry – right from the start. One of our goals is to also advise on policy – for example, with support tools for decision makers. The project is an important building block for the European Union’s Water Framework Directive, which is currently under revision. Our research results are to be directly integrated into the process.”

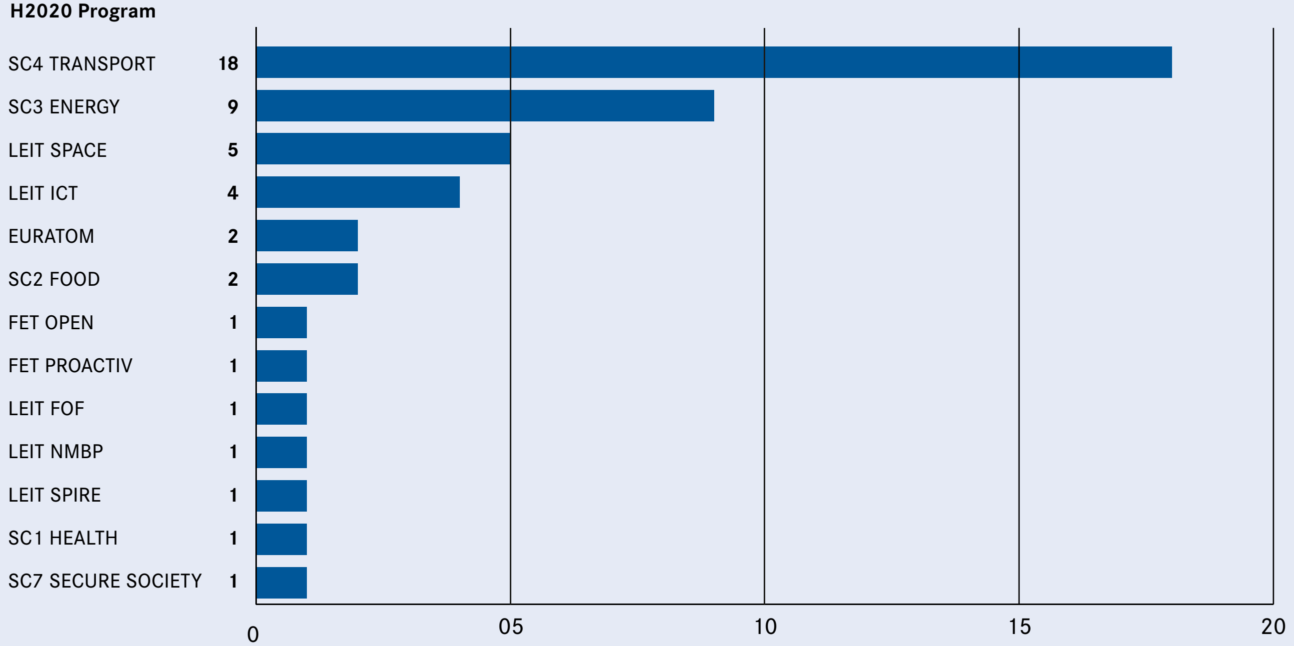
(ka)

STATISTICS

NUMBER OF PROJECTS COORDINATED BY HELMHOLTZ (PER FP7 PROGRAM SECTION)



NUMBER OF PROJECTS COORDINATED BY HELMHOLTZ (PER HORIZON 2020 PROGRAM SECTION)



Source: H2020-ECORDA database (contracted projects) as of 30.10.2017, EU office of the BMBF.

STRONG NETWORKS IN EUROPE: NUMBER OF COLLABORATIONS BY COUNTRY

in projects coordinated by Helmholtz research centers (FP7/H2020)

Source: Statistics of the Helmholtz Office Brussels (data as of 30.10.2017).
Note: 85 additional worldwide collaborations are not shown in this map.

COLLABORATIVE PROJECTS COORDINATED BY HELMHOLTZ IN FP7 AND HORIZON 2020

Source: H2020-ECORDA database (contracted projects) as of 08.03.2015 and 30.10.2017, EU office of the BMBF.

7TH FRAMEWORK PROGRAM

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-ENERGY	DLR	Friedrich, K. Andreas	DECODE	Understanding of degradation mechanisms to improve components and design of PEFC	11	5.653.155 €	3.699.996 €
FP7-ENERGY	DLR	Linder, Marc	TCSPOWER	Thermochemical Energy Storage for Concentrated Solar Power Plants	7	4.421.226 €	2.849.240 €
FP7-ENERGY	DLR	Roeb, Martin	HYCYCLES	Materials and components for Hydrogen production by sulphur based thermochemical cycles	8	5.123.432 €	3.748.823 €
FP7-ENERGY	FZJ	Meulenberg, Wilhelm Albert	GREEN-CC	Graded Membranes for Energy Efficient New Generation Carbon Capture Process	13	8.137.278 €	5.462.714 €
FP7-ENERGY	GFZ	Huenges, Ernst	GEISER	Geothermal engineering integrating mitigation of induced seismicity in reservoirs	12	7.115.977 €	5.308.869 €
FP7-ENERGY	GFZ	Liebscher, Axel	CO2CARE	CO2 Site Closure Assessment Research	22	5.313.493 €	3.966.574 €
FP7-ENERGY	KIT	Breitling, Frank	PEPDIODE	Peptide-based diodes for solar cells	7	3.643.131 €	2.749.966 €
FP7-ENERGY	KIT	Dahmen, Nikolaus	BIOBOOST	Biomass based energy intermediates boosting biofuel production	12	7.097.299 €	5.088.531 €
FP7-ENERGY	KIT	Fichtner, Maximilian	NANOHY	Novel nanocomposites for hydrogen storage applications	8	3.402.946 €	2.399.629 €
FP7-ENVIRONMENT	AWI	Hubberten, Hans-Wolfgang	PAGE21	Changing Permafrost in the Arctic and its Global Effects in the 21st Century	18	9.343.585 €	6.951.895 €
FP7-ENVIRONMENT	AWI	Rex, Markus	STRATOCLIM	Stratospheric and upper tropospheric processes for better climate predictions	27	11.318.238 €	8.548.478 €
FP7-ENVIRONMENT	FZJ	von Hobe, Marc	RECONCILE	Reconciliation of essential process parameters for an enhanced predictability of arctic stratospheric ozone loss and its climate interactions.	15	4.656.564 €	3.499.782 €
FP7-ENVIRONMENT	GEOMAR	Wallmann, Klaus	ECO2	Sub-seabed CO2 Storage: Impact on Marine Ecosystems (ECO2)	28	13.978.174 €	10.500.000 €
FP7-ENVIRONMENT	HZDR	Eckert, Sven	SIKELOR	Silicon kerf loss recycling	4	1.954.286 €	1.401.498 €
FP7-ENVIRONMENT	UFZ	Bartke, Stephan	TIMBRE	An Integrated Framework of Methods, Technologies, Tools and Policies for Improvement of Brownfield Regeneration in Europe	15	4.650.820 €	3.443.502 €
FP7-ENVIRONMENT	UFZ	Brack, Werner	SOLUTIONS	Solutions for present and future emerging pollutants in land and water resources management	39	16.323.010 €	11.988.935 €
FP7-ENVIRONMENT	UFZ	Henle, Klaus	SCALES	Securing the Conservation of biodiversity across Administrative Levels and spatial, temporal, and Ecological Scales	30	10.331.248 €	6.995.640 €
FP7-ENVIRONMENT	UFZ	Kästner, Matthias	ModelPROBE	Model driven Soil Probing, Site Assessment and Evaluation	16	4.679.911 €	3.397.609 €
FP7-ENVIRONMENT	UFZ	Werban, Ulrike	iSOIL	Interactions between soil related sciences - Linking geophysics, soil science and digital soil mapping	18	4.643.731 €	3.420.623 €

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-ENVIRONMENT	HZG	Jacob, Daniela	IMPACT2C	Quantifying projected impacts under 2°C warming	28	8.447.373 €	6.500.000 €
FP7-ENVIRONMENT	GFZ	Zschau, Jochen	MATRIX	New Multi-Hazard and Multi-Risk Assessment Methods for Europe	11	4.314.417 €	3.395.871 €
FP7-ENVIRONMENT	KIT	Arneth, Almut	LUC4C	Land use change: assessing the net climate forcing, and options for climate change mitigation and adaptation	14	8.005.363 €	5.999.079 €
FP7-ENVIRONMENT	KIT	Knippertz, Peter	DACCIWA	Dynamics-aerosol-chemistry-cloud interactions in West Africa	16	11.508.227 €	8.746.952 €
FP7-EURATOM-FISSION	FZJ	von Lensa, Werner	CARBOWASTE	Treatment and disposal of irradiated graphite and other carbonaceous waste	29	12.292.115 €	6.000.000 €
FP7-EURATOM-FISSION	HMGU	Atkinson, Michael John	DARK.RISK	Studies on a cohort of Serbian children exposed to x-irradiation to determine the contribution of the non-coding genome to susceptibility at low doses	4	2.258.849 €	1.730.000 €
FP7-EURATOM-FISSION	HMGU	Atkinson, Michael John	PROCARDIO	Cardiovascular Risk from Exposure to Low-dose and Low-dose-rate Ionizing Radiation	12	5.489.075 €	2.998.387 €
FP7-EURATOM-FISSION	HMGU	Hoeschen, Christoph	MADEIRA	Minimizing activity and dose with enhanced image quality by radiopharmaceutical administrations	6	3.948.824 €	2.820.000 €
FP7-EURATOM-FISSION	HMGU	Jacob, Peter	EPIRADBIO	Combining epidemiology and radiobiology to assess cancer risks in the breast, lung, thyroid and digestive tract after exposures to ionizing radiation with total doses in the order of 100 mSv or below	19	9.935.944 €	5.818.073 €
FP7-EURATOM-FISSION	HZDR	Altstadt, Eberhard	LONGLIFE	Treatment of long term irradiation embrittlement effects in RPV safety assessment	16	5.222.397 €	2.621.575 €
FP7-EURATOM-FISSION	KIT	Rabung, Thomas	CROCK	Crystalline Rock Retention Processes	9	1.789.231 €	1.057.927 €
FP7-EURATOM-FISSION	KIT	Fazio, Concetta	GETMAT	Gen IV and transmutation materials	23	13.959.123 €	7.500.000 €
FP7-EURATOM-FISSION	KIT	Altmaier, Marcus	RECOSY	Redox phenomena controlling systems	31	6.199.294 €	3.500.000 €
FP7-EURATOM-FISSION	KIT	Cheng, Xu	THINS	Thermal-hydraulics of Innovative Nuclear Systems	23	10.592.855 €	5.941.811 €
FP7-EURATOM-FISSION	KIT	Kienzler, Bernhard	FIRST-NUCLIDES	Fast / Instant Release of Safety Relevant Radionuclides from Spent Nuclear Fuel	10	4.741.261 €	2.494.513 €
FP7-EURATOM-FISSION	KIT	Raskob, Wolfgang	NERIS-TP	Towards a self sustaining European Technology Platform (NERIS-TP) on Preparedness for Nuclear and Radiological Emergency Response and Recovery	20	2.722.760 €	1.455.748 €
FP7-EURATOM-FISSION	KIT	Raskob, Wolfgang	PREPARE	Innovative integrative tools and platforms to be prepared for radiological emergencies and post-accident response in Europe	48	6.501.034 €	4.000.000 €
FP7-EURATOM-FISSION	KIT	Sanchez Espinoza, Victor Hugo	HPMC	High performance Monte Carlo reactor core analysis	3	880.611 €	550.906 €

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-HEALTH	DKFZ	Boutros, Michael	CANCER-PATHWAYS	Developmental molecular pathways in Drosophila as a model for human cancer	7	4.438.623 €	2.995.295 €
FP7-HEALTH	DKFZ	Herzig, Stephan	DIABAT	Recruitment and activation of brown adipocytes as preventive and curative therapy for type 2 diabetes	20	9.958.633 €	5.999.998 €
FP7-HEALTH	DKFZ	Offringa, Rienk	IACT	Immunostimulatory Agonist antibodies for Cancer Therapy	9	8.227.908 €	5.995.747 €
FP7-HEALTH	HMGU	Ntziachristos, Vasilis	FMTXCT	Hybrid fluorescence molecular tomography and X-ray computed tomography system and method	7	5.839.676 €	4.512.141 €
FP7-HEALTH	HMGU	Wurst, Wolfgang	EUCOMM-TOOLS	EUCOMM: Tools for Functional Annotation of the Mouse Genome	10	18.169.877 €	11.999.673 €
FP7-HEALTH	HMGU	Ziegler-Heitbrock, Loems	EVA	Markers for emphysema versus airway disease in COPD	14	3.952.829 €	2.984.025 €
FP7-HEALTH	HZI	Chhatwal, Singh	CARE-PNEUMO	Combating antibiotics resistant pneumococci by novel strategies based on in vivo and in vitro host pathogen interactions	12	3.969.999 €	2.999.999 €
FP7-HEALTH	KIT	Breitling, Frank	TARGET-BINDER	Target binders	9	5.553.931 €	3.988.730 €
FP7-HEALTH	KIT	Breitling, Frank	PEPLASER	Combinatorial synthesis of peptide arrays with a laser printer	11	4.028.615 €	2.988.450 €
FP7-HEALTH	KIT	Geisler, Robert	ZF-HEALTH	Zebrafish Regulomics for Human Health	19	15.313.507 €	11.375.000 €
FP7-HEALTH	MDC	Hübner, Nobert	EURATRANS	European large-scale functional genomics in the rat for translational research	18	13.695.674 €	10.500.000 €
FP7-ICT	DLR	Borst, Christoph	GERT	Generalising Robot Manipulation Task	4	3.691.311 €	2.822.797 €
FP7-ICT	DLR	Ebendt, Rüdiger	SIMPLEFLEET	Democratizing Fleet Management	3	1.909.815 €	1.409.000 €
FP7-ICT	DLR	Leich, Andreas	COLOMBO	Cooperative Self-Organizing System for low Carbon Mobility at low Penetration Rates	5	2.908.491 €	2.131.000 €
FP7-ICT	DLR	Raulefs, Ronald	WHERE	Wireless hybrid enhanced mobile radio estimators	15	5.551.112 €	4.046.843 €
FP7-ICT	DLR	Raulefs, Ronald	WHERE2	Wireless Hybrid Enhanced Mobile Radio Estimators - Phase 2	18	7.446.518 €	5.257.776 €
FP7-ICT	DLR	Stramigioli, Stefano	VIACTORS	Variable impedance actuation systems embodying advanced interaction behaviours	5	4.503.559 €	3.350.000 €
FP7-ICT	DLR	Van der Smagt, Patrick	STIFF	Enhancing biomorphic agility through variable stiffness	6	3.890.520 €	2.953.710 €
FP7-ICT	FZJ	Mohr, Bernd	HOPSA-EU	HOlistic Performance System Analysis-EU	4	1.925.138 €	1.399.966 €
FP7-ICT	FZJ	Scharr, Hanno	GARNICS	Gardening with a Cognitive System	3	3.721.066 €	2.871.000 €
FP7-ICT	FZJ	Suarez, Estela	DEEP-ER	DEEP Extended Reach	16	9.823.190 €	6.430.000 €
FP7-ICT	FZJ	Suarez, Estela	DEEP	Dynamical Exascale Entry Platform	17	16.284.454 €	8.030.000 €

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-ICT	GFZ	Wächter, Joachim	TRIDEC	Collaborative, Complex and Critical Decision-Support in Evolving Crises	10	8.898.342 €	6.794.766 €
FP7-ICT	KIT	Becker, Jürgen	ALMA	Architecture oriented paraLlelization for high performance embedded Multicore systems using scilAb	8	4.430.522 €	3.200.000 €
FP7-ICT	KIT	Dillmann, Rüdiger	XPERIENCE	Robots Bootstrapped through Learning from Experience	6	10.046.377 €	7.634.000 €
FP7-ICT	KIT	Kohl, Manfred	NAVOLCHI	Nano Scale Disruptive Silicon-Plasmonic Platform for Chip-to-Chip Interconnection	7	3.395.396 €	2.400.000 €
FP7-ICT	KIT	Leuthold, Juerg	SOFI	Silicon-Organic hybrid Fabrication platform for Integrated circuits	7	3.515.110 €	2.499.926 €
FP7-ICT	KIT	Rettinger, Achim	XLIME	xLiMe – crossLingual crossMedia knowledge extraction	8	3.897.357 €	2.987.000 €
FP7-ICT	KIT	Shnirman, Alexander	GEOMDISS	Geometric phases, pumping, and dissipation in quantum devices	10	2.733.693 €	2.045.034 €
FP7-ICT	KIT	Simperl, Elena	RENDER	Reflecting Knowledge Diversity	6	4.432.086 €	2.957.914 €
FP7-ICT	KIT	Waibel, Alex	EU-BRIDGE	Bridges Across the Language Divide	11	10.368.777 €	7.875.000 €
FP7-JTI-CS	HZG	Kashaev, Nikolai	LAWENDEL	Laser welding of newly developed Al-Li alloy	1	149.996 €	112.497 €
FP7-JTI-FCH	DLR	Friedrich, Andreas	EVOLVE	Evolved materials and innovative design for high-performance, durable and reliable SOFC cell and stack	7	5.711.232 €	3.105.093 €
FP7-JTI-FCH	DLR	Friedrich, Andreas	IMPACT	Improved Lifetime of Automotive Application Fuel Cells with ultra low Pt-loading	11	9.144.498 €	3.902.403 €
FP7-JTI-FCH	DLR	Lang, Michael	SOCTESQA	Solid Oxide Cell and Stack Testing, Safety and Quality Assurance	5	3.212.186 €	1.626.373 €
FP7-JTI-FCH	DLR	Martin, Stefan	NEMESIS2+	New Method for Superior Integrated Hydrogen Generation System 2+	6	3.393.341 €	1.614.944 €
FP7-JTI-FCH	DLR	Reißner, Regine	RESELYSER	Hydrogen from RES: pressurised alkaline electrolyser with high efficiency and wide operating range	3	2.888.957 €	1.484.358 €
FP7-JTI-FCH	FZJ	Steinberger-Wilckens, Robert	SOFC-LIFE	Solid Oxide Fuel Cells – Integrating Degradation Effects into Lifetime Prediction Models	12	5.649.854 €	2.418.620 €
FP7-JTI-FCH	HZB	van de Krol, Roel	PECDEMO	Photoelectrochemical Demonstrator Device for Solar Hydrogen Generation	6	3.337.683 €	1.830.644 €
FP7-JTI-FCH	HZG	Taube, Klaus	BOR4STORE	Fast, reliable and cost effective boron hydride based high capacity solid state hydrogen storage materials	8	4.070.711 €	2.273.682 €
FP7-JTI-FCH	KIT	Trimis, Dimosthenis	HELMETH	Integrated High-Temperature Electrolysis and Methanation for Effective Power to Gas Conversion	6	3.816.612 €	2.529.352 €

Program	Coordina-tor	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-KBBE	GEOMAR	Imhoff, Johannes	MARINE FUNGI	Natural products from marine fungi for the treatment of cancer	12	3.850.907 €	2.999.898 €
FP7-KBBE	HZI	Pieper, Dietmar	MAGICPAH	Molecular Approaches and MetaGenomic Investigations for optimizing Clean-up of PAH contaminated sites	13	4.515.496 €	2.997.137 €
FP7-KBBE	KIT	Puchta, Holger	RECBREED	Recombination: an old and new tool for plant breeding	7	4.174.447 €	2.997.147 €
FP7-NMP	DLR	Wille, Tobias	ECOMISE	Enabling Next Generation Composite Manufacturing by In-Situ Structural Evaluation and Process Adjustment	10	5.379.337 €	3.549.744 €
FP7-NMP	FZJ	Stellbrink, Jörg	MAO-ROBOTS	Methylaluminoxane (MAO) activators in the molecular polyolefin factory	6	4.676.386 €	3.067.975 €
FP7-NMP	FZJ	Gordijn, Aad	FAST TRACK	Accelerated development and prototyping of nano-technology-based high-efficiency thin-film silicon solar modules	24	12.882.465 €	8.574.756 €
FP7-NMP	FZJ	Meulenberg, Wilhelm A.	NASA-OTM	NAnostructured Surface Activated ultra-thin Oxygen Transport Membrane	7	4.978.135 €	3.200.363 €
FP7-NMP	HZG	Abetz, Volker	HARCANA	High aspect ratio carbon-based nanocom-posites	11	7.387.534 €	5.442.052 €
FP7-NMP	HZG	Abetz, Volker	SELFMEM	Self-assembled polymer membranes	13	5.209.774 €	3.599.734 €
FP7-NMP	HZG	Taube, Klaus	FLYHY	Fluorine substituted High Capacity Hydrides for Hydrogen Storage at low working temperatures	5	2.749.818 €	2.099.200 €
FP7-NMP	KIT	Colsmann, Alexander	MATHERO	New materials for highly efficient and reliable organic solar cells	6	5.158.271 €	3.611.691 €
FP7-NMP	KIT	Lahann, Jörg	SAVVY	Self-assembled virus-like vectors for stem cell phenotyping	7	4.857.066 €	3.782.729 €
FP7-NMP	KIT	Maier, Thomas	SKILLPRO	Skill-based Propagation of “Plug&Produce”-Devices in Reconfigurable Production Systems by AML	11	5.109.801 €	3.840.000 €
FP7-NMP	KIT	Scholz, Steffen	SMARTLAM	Smart production of Microsystems based on laminated polymer films	8	3.633.792 €	2.673.000 €
FP7-SECURITY	DLR	Párraga Niebla, Cristina	A4A	Alert for All	11	4.909.484 €	3.497.469 €
FP7-SPACE	DLR	Degenhard, Richard	DESICOS	New Robust DESIgn Guideline for Imperfection Sensitive COmposite Launcher Structures	11	3.098.287 €	1.997.700 €
FP7-SPACE	DLR	Erbertseder, Thilo	PASODOBLE	Promote air quality services integrating observations development of basic localised information for Europe	21	7.172.415 €	4.999.304 €
FP7-SPACE	DLR	Esser, Burkard	THOR	Innovative thermal management concepts for thermal protection of future space vehicles	8	2.647.089 €	1.967.768 €
FP7-SPACE	DLR	Gauer, Markus	PRECISE	Chemical-μPropulsion for an Efficient and Accurate Control of Satellites for Space Exploration	6	2.830.429 €	1.829.367 €

Program	Coordina-tor	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-SPACE	DLR	Gerndt, Andreas	CROSS DRIVE	Collaborative Rover Operations and Planetary Science Analysis System based on Distributed Remote and Interactive Virtual Environments	6	3.586.759 €	2.493.427 €
FP7-SPACE	DLR	Gülhan, Ali	SACOMAR	Technologies for Safe and Controlled Martian Entry	7	690.531 €	499.485 €
FP7-SPACE	DLR	Gülhan, Ali	ABLAMOD	Advanced Ablation Characterization and Modelling	9	2.737.272 €	1.981.906 €
FP7-SPACE	DLR	Harris, Allan	NEOSHIELD	A Global Approach to Near-Earth Object Impact Threat Mitigation	12	5.843.115 €	3.963.009 €
FP7-SPACE	DLR	Mulero Chaves, Javier	PHAROS	Project on a multi-hazard open platform for satellite based downstream services	7	3.430.191 €	2.499.440 €
FP7-SPACE	DLR	Oschwald, Michael	LIROC	Laser Ignition Technology for Rocket Engines	3	827.654 €	481.828 €
FP7-SPACE	DLR	Reitz, Günther	HAMLET	Human model MATROSHKA for radiation exposure determination of astronauts	6	1.382.975 €	1.067.614 €
FP7-SPACE	DLR	Theil, Stefan	SINPLEX	Small Integrated Navigator for PLanetary Exploration	4	2.614.982 €	1.998.619 €
FP7-SPACE	GFZ	Pittore, Massimiliano	SENSUM	Framework to integrate Space-based and in-situ sENSing for dynamic vUlnerability and recovery Monitoring	7	2.439.075 €	1.931.683 €
FP7-SSH	UFZ	Rink, Dieter	SHRINK SMART	Governance of shrinkage within a European context	8	1.990.588 €	1.496.091 €
FP7-TRANSPORT	DLR	Claßen, Axel	ASSET	ASSET aeronautic study on seamless transport	14	3.640.097 €	2.291.255 €
FP7-TRANSPORT	DLR	Bake, Friedrich	RECORD	Research on Core Noise Reduction	19	5.935.211 €	4.008.962 €
FP7-TRANSPORT	DLR	Boden, Fritz	AIM²	Advanced In-flight Measurement Tech-niques 2	9	5.120.454 €	3.754.447 €
FP7-TRANSPORT	DLR	Ehrler, Verena	COFRET	Carbon footprint of freight transport	13	2.836.460 €	1.993.909 €
FP7-TRANSPORT	DLR	Enghardt, Lars	FLOCON	Adaptive and passive flow control for fan broadband noise reduction	16	5.277.682 €	3.562.536 €
FP7-TRANSPORT	DLR	Hasselberg, Andreas	A-PIMOD	Applying Pilot Models for Safer Aircraft	7	4.772.266 €	3.472.661 €
FP7-TRANSPORT	DLR	Hühne, Christian	ALASCA	Advanced Lattice Structures for Composite Airframes	12	3.431.752 €	1.350.260 €
FP7-TRANSPORT	DLR	Hühne, Christian	POLARBEAR	Production and Analysis Evolution For Lattice Related Barrel Elements Under Operations With Advanced Robustness	12	3.419.215 €	1.195.734 €
FP7-TRANSPORT	DLR	Kroll, Norbert	IDIHOM	Industrialisation of High-Order Methods A Top-Down Approach	20	5.659.942 €	4.166.569 €
FP7-TRANSPORT	DLR	Maertens, Sven	TEAM_PLAY	Tool Suite for Environmental and Economic Aviation Modelling for Policy Analysis	18	5.265.893 €	3.867.496 €
FP7-TRANSPORT	DLR	Matthes, Sigrun	REACT4C	Reducing emissions from Aviation by chang-ing trajectories for the benefit of climate	7	4.166.718 €	3.195.555 €

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
FP7-TRANSPORT	DLR	Monner, Hans Peter	SADE	Smart high lift devices for next generation wings	12	7.093.862 €	4.969.975 €
FP7-TRANSPORT	DLR	Nagel, Björn	SOAR	diStributed Open-rotor AiRcraft	3	782.889 €	591.214 €
FP7-TRANSPORT	DLR	Sand, Stephan	GRAMMAR	Galileo Ready Advanced Mass MArket Receiver	2	2.656.414 €	1.999.581 €
FP7-TRANSPORT	DLR	Schwamborn, Dieter	ATAAC	Advanced turbulence simulation for aerodynamic application challenges	21	5.653.952 €	3.791.012 €
FP7-TRANSPORT	DLR	Sippel, Martin	CHATT	Cryogenic Hypersonic Advanced Tank Technologies	10	4.237.231 €	3.225.681 €
FP7-TRANSPORT	DLR	von Geyr, Heiko	DESIREH	Design, simulation and flight reynolds number testing for advanced high-lift solutions	20	7.078.825 €	4.992.335 €

HORIZON 2020

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
H2020-Euratom	KIT	Sanchez Espinoza, Victor Hugo	McSAFE	High-Performance Monte Carlo Methods for SAFEty Demonstration- From Proof of Concept to realistic Safety Analysis and Industry-like Applications	11	3.140.394 €	2.981.592 €
H2020-Euratom	KIT	Altmaier, Marcus	Cebama	Cement-based materials, properties, evolution, barrier functions	27	5.952.945 €	3.868.607 €
H2020-FET Open	KIT	Fichtner, Maximilian	LiRichFCC	A new class of powerful materials for electrochemical energy storage: Lithium-rich oxyfluorides with cubic dense packing	4	4.114.754 €	4.114.754 €
H2020-FET Proactiv	FZJ	Suarez, Estela	DEEP-EST	Extreme Scale Technologies	18	15.873.341 €	15.873.341 €
H2020-LEIT-FoF	KIT	Lanza, Gisela	ProRegio	Customer-driven design of product-services and production networks to adapt to regional market requirements	11	5.151.088 €	5.145.321 €
H2020-LEIT-ICT	HMGU	Ntziachristos, Vasilis	ESOTRAC	Hybrid optical and optoacoustic endoscope for esophageal tracking.	8	4.000.603 €	4.000.603 €
H2020-LEIT-ICT	HZDR	Von Borany, Johannes	IONS4SET	Ion-irradiation-induced Si Nanodot Self-Assembly for Hybrid SET-CMOS Technology	5	3.999.205 €	3.999.205 €
H2020-LEIT-ICT	KIT	Hein, Björn	SafeLog	Safe human-robot interaction in logistic applications for highly flexible warehouses	5	4.618.463 €	4.618.463 €
H2020-LEIT-ICT	KIT	Becker, Jürgen	ARGO	WCET-Aware Parallelization of Model-Based Applications for Heterogeneous Parallel Systems	8	3.892.181 €	3.892.181 €
H2020-LEIT-NMBP	DLR	Sutter, Florian	RAISELIFE	Raising the Lifetime of Functional Materials for Concentrated Solar Power Technology	12	10.509.247 €	9.291.723 €
H2020-LEIT-Space	DLR	Fey, Görschwin	MaMMoTH-Up	Massively extended Modular Monitoring for Upper Stages	4	2.784.014 €	2.784.014 €

Program	Coordinator	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
H2020-LEIT-Space	DLR	Gerndt, Andreas	Rheform	Replacement of hydrazine for orbital and launcher propulsion systems	6	3.787.554 €	3.787.554 €
H2020-LEIT-Space	DLR	Lehner, Susanne	BASE-platform	Bathymetry Service Platform	6	2.222.395 €	1.781.326 €
H2020-LEIT-Space	DLR	Schubert, Daniel	EDEN ISS	Ground Demonstration of Plant Cultivation Technologies and Operation in Space for Safe Food Production on-board ISS and Future Human Space Exploration Vehicles and Planetary Outposts	12	4.550.868 €	4.535.869 €
H2020-LEIT-Space	DLR	Sperl, Matthias	RegoLight	Sintering Regolith with Solar Light	4	999.373 €	999.373 €
H2020-LEIT-SPIRE	KIT	Trimis, Dimothenis	ECCO	Energy Efficient Coil Coating Process	11	9.803.316 €	7.850.029 €
H2020-SC1-JTI IMI	DKFZ	Pfister, Stefan	ITCC-P4	ITCC Pediatric Preclinical POC Platform (ITCC-P4)	20	16.562.830 €	7.370.000 €
H2020-SC2-Food	AWI	Jung, Thomas	APPLICATE	Advanced Prediction in Polar regions and beyond: Modelling, observing system design and LInkages associated with ArctiC ClimATE change	15	8.715.066 €	7.999.591 €
H2020-SC2-Food	GEOMAR	Visbeck, Martin	AtlantOS	Optimizing and Enhancing the Integrated Atlantic Ocean Observing System	62	20.652.921 €	20.652.921 €
H2020-SC3-Energy	DLR	Herbst, Melanie	Bio-HyPP	Biogas-fired Combined Hybrid Heat and Power Plant	7	5.775.869 €	5.775.869 €
H2020-SC3-Energy	DLR	Reißner, Regine	QualyGridS	Standardized Qualifying tests of electrolysers for grid services	9	2.811.263 €	1.996.795 €
H2020-SC3-Energy	DLR	Thomey, Dennis	PEGASUS	Renewable Power Generation by Solar Particle Receiver Driven Sulphur Storage Cycle	5	4.695.365 €	4.695.365 €
H2020-SC3-Energy	FZJ	Ding, Kaining	NextBase	Next-generation interdigitated back-contacted silicon heterojunction solar cells and modules by design and process innovations	13	5.668.751 €	3.800.421 €
H2020-SC3-Energy	GFZ	Bruhn, David	GEMex	GEMex: Cooperation in Geothermal energy research Europe-Mexico for development of Enhanced Geothermal Systems and Superhot Geothermal Systems	23	9.999.793 €	9.999.793 €
H2020-SC3-Energy	GFZ	Huenges, Ernst	DESTRESS	Demonstration of soft stimulation treatments of geothermal reservoirs	15	25.132.511 €	10.713.409 €
H2020-SC3-Energy	GFZ	Reinsch, Thomas	SURE	Novel Productivity Enhancement Concept for a Sustainable Utilization of a Geothermal Resource	9	6.143.415 €	5.892.165 €
H2020-SC3-Energy	HZB	Calnan, Sonya	PECSYS	Technology demonstration of large-scale photo-electrochemical system for solar hydrogen production	5	2.499.993 €	2.499.993 €
H2020-SC3-Energy	KIT	Südmeyer, Isabelle	SmILES	Smart Integration of Energy Storages in Local Multi Energy Systems for maximising the Share of Renewables in Europe's Energy Mix	5	2.440.683 €	2.440.683 €

Program	Coordina-tor	Surname, Name	Acronym	Project title	Number of partners	Total Cost	EU Contribution
H2020-SC4-JTI CS2	DLR	Panthen, Britta	AllOxITD	Development and Manufacturing of an All-Oxide Inter Turbine Duct for Aeroengines	2	3.489.853 €	3.072.595 €
H2020-SC4-JTI CS2	DLR	Voges, Melanie	ROSSINI	Radial cOmpresSor Surge INception Investigation	1	1.102.459 €	1.102.459 €
H2020-SC4-JTI CS2	DLR	Willberg, Christian	DEMETER	Development of E2E Maintenance archi-tecture process and methods enabling a reliable and economic air transport system	1	1.749.911 €	1.749.911 €
H2020-SC4-JTI CS2	DLR	Zimmer, Dirk	ENERGIZE	Efficient Energy Management for Greener Aviation	1	940.935 €	940.935 €
H2020-SC4-S2R JU	DLR	Meyer zu Hörste, Michael	IMPACT-1	Indicator Monitoring for a new railway PAradigm in seamlessly integrated Cross modal Transport chains – Phase 1	6	Not available	299.952 €
H2020-SC4-SESAR JU	DLR	Jakobi, Jörn	MALORCA	Machine Learning of Speech Recognition Models for Controller Assistance	4	805.588 €	538.104 €
H2020-SC4-SESAR JU	DLR	Jakobi, Jörn	PJ05 Remote Tower	Remote Tower for Multiple Airports	29	13.877.477 €	1.828.086 €
H2020-SC4-SESAR JU	DLR	Keller, Karl-Heinz	PJ28 IAO	Integrated Airport Operations	13	5.715.918 €	2.438.152 €
H2020-SC4-SESAR JU	DLR	Mathes, Sigrun	ATM4E	Air Traffic Management for environment	5	599.625 €	599.625 €
H2020-SC4-SESAR JU	DLR	Többen, Helmut	MINIMA	MItigating Negative Impacts of Monitoring high levels of Automation	2	582.780 €	582.780 €
H2020-SC4-Transport	DLR	Bachmann, Jens	ECO-COMPASS	Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures	7	1.893.685 €	1.893.685 €
H2020-SC4-Transport	DLR	Enghardt, Lars	TurboNoiseBB	Validation of improved turbomachinery noise prediction models and development of novel design methods for fan stages with reduced broadband noise	14	6.702.851 €	6.702.851 €
H2020-SC4-Transport	DLR	Knobloch, Karsten	ARTEM	Aircraft noise Reduction Technologies and related Environmental iMpact	23	7.923.743 €	7.498.743 €
H2020-SC4-Transport	DLR	Nagel, Björn	AGILE	Aircraft 3rd Generation MDO for Innovative Collaboration of Heterogeneous Teams of Experts	19	8.965.932 €	7.074.807 €
H2020-SC4-Transport	DLR	Rauch, Bastian	JETSCREEN	JET Fuel SCREENing and Optimization	13	7.469.355 €	7.469.355 €
H2020-SC4-Transport	DLR	Schieben, Anna	interACT	Designing cooperative interaction of automated vehicles with other road users in mixed traffic environments	7	5.527.581 €	5.527.581 €
H2020-SC4-Transport	DLR	Schindler, Julian	TransAID	Transition Areas for Infrastructure-Assisted Driving	6	3.836.354 €	3.836.354 €
H2020-SC4-Transport	DLR	Wölki, Marko	MAVEN	Managing Automated Vehicles Enhances Network	8	3.149.661 €	3.149.661 €
H2020-SC4-Secure Society	DLR	Mulero Chavez, Javier	HEIMDALL	Heimdall – Multi-Hazard Cooperative Management Tool For Data Exchange, Response Planning And Scenario Building	13	8.591.344 €	7.836.371 €

COLOR KEY

- *Energy*
- *Earth and Environment*
- *Health*
- *Aeronautics, Space and Transport*
- *Key Technologies*
- *Other*

ABBREVIATIONS: PROGRAM

CS(2)	*Clean Sky (2)*
FCH	*Fuel Cells and Hydrogen*
FET	*Future and Emerging Technologies*
FOF	*Factories of the Future*
ICT	*Information and Communication Technologies*
IMI	*Innovative Medicine Initiative*
JTI	*Joint Technology Initiative*
JU	*Joint Undertaking*
KBBE	*Knowledge-based Bio-Economy*
LEIT	*Leadership in Enabling and Industrial Technologies*
NMP	*Nanosciences and Nanotechnologies, Materials, New Production Technologies*
NMBP	*Nanotechnologies, Advanced Materials, Biotechnology, and Advanced Manufacturing and Processing*
S2R	*Shift2Rail*
SC	*Societal Challenge*
SESAR	*Single European Sky ATM Research*
SSH	*Social Sciences and Humanities*
SPIRE	*Sustainable Process Industry through Resource & Energy Efficiency*

ABBREVIATIONS: COORDINATOR

AWI	*Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research*
DESY	*Deutsches Elektronen-Synchrotron DESY*
DKFZ	*German Cancer Research Center*
DLR	*German Aerospace Center*
DZNE	*German Center for Neurodegenerative Diseases*
FZJ	*Forschungszentrum Jülich*
GEOMAR	*GEOMAR Helmholtz Centre for Ocean Research Kiel*
GSI	*GSI Helmholtz Centre for Heavy Ion Research*
HZB	*Helmholtz-Zentrum Berlin für Materialien und Energie*
HZDR	*Helmholtz-Zentrum Dresden-Rossendorf*
HZI	*Helmholtz Centre for Infection Research*
UFZ	*Helmholtz Centre for Environmental Research – UFZ*
HZG	*Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research*
HMGU	*Helmholtz Zentrum München – German Research Center for Environmental Health*
GFZ	*Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences*
KIT	*Karlsruhe Institute of Technology*
MDC	*Max Delbrück Center for Molecular Medicine in the Helmholtz Association*
IPP	*Max Planck Institute for Plasma Physics (associate member)*

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